

ARBORETUM BULLETIN

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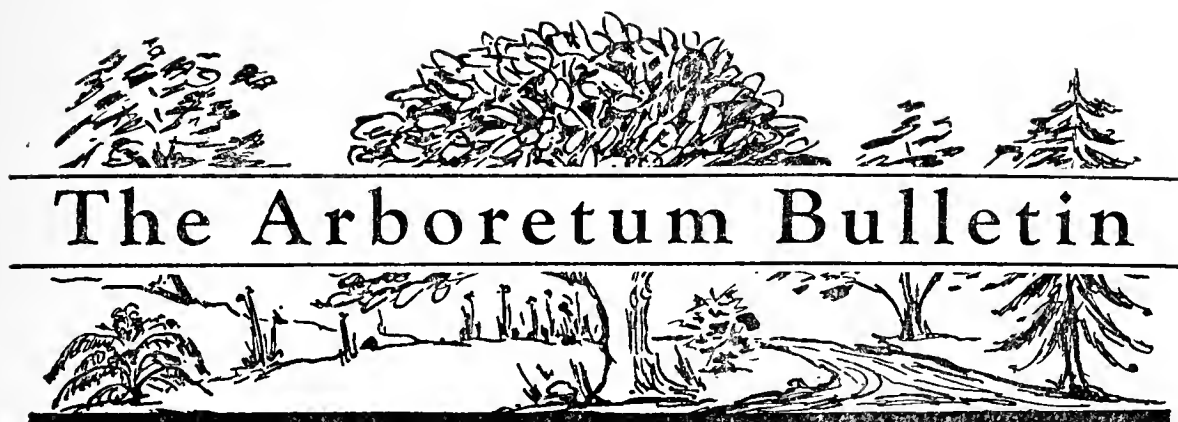
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A General Plan for Lilac Collections In Public Gardens

*With Particular Reference to the New
University of Washington Arboretum
in Seattle*

JOHN C. WISTER,* *Landscape Architect*
Introduction

A CENTURY or two ago when a botanical garden was founded sections were marked out for each of the then recognized plant families and a few well known species that were supposed to have medicinal value were planted. The whole garden might not require more than an acre or so.

Nowadays it is not so simple. So many thousands of new species of trees, shrubs and herbaceous plants have been discovered that no one institution can attempt to grow them all. Therefore any new garden must choose the type of work it will attempt to cover and what type of plants it will emphasize.

The Arboretum of the University of Washington is still so new that all of its policies have not been determined. But a decision has been reached that among flowering shrubs, important collections will, for the present at least, be confined to rhododendrons, azaleas, camellias, lilacs and a few others that do particularly well in the Puget Sound region.

*Mr. Wister is director of the Scott Horticultural Foundation of Swarthmore College which has a notably fine lilac collection. He is chairman of the Committee on Horticultural Varieties of the American Association of Botanical Gardens and Arboretums. He was chairman of the sub-committee on the 1941 Lilac Survey and the editor of "Lilacs for America," the report of that survey.

Because of my work in the 1941 lilac survey I have been asked to prepare for this BULLETIN some suggestions about the importance that the lilac collection should have in this new Arboretum. I believe lilac collections should have an important place in public parks and I think this new Arboretum has an unique opportunity to build up the finest lilac collection in America. I don't mean the largest. Anyone foolish enough to wish to, can have the largest collection by simply planting one more kind and/or one more plant than the largest that now exists. That does not get us anywhere. Some rival garden will come along and put in one more plant.

By "the finest" I mean first of all the collection that has the most comprehensive botanical foundation in a collection of authenticated wild species and of their important botanical (wild) varieties grouped first according to their botanical relations and then geographically and chronologically according to habitat and their discovery by man and introduction into cultivation.

The Botanical Foundation of a Lilac Collection

Such a collection will not be hard to assemble. Rehder states there are about 28 species but does not describe them all, an indication that some are unimportant. About 25 plants will be enough and will not take much room. They should be arranged (1) in their botanical relationship. *Subgenus Eusyringa* is divided into series *Villosae* with nine important species, series *Vulgares* with eleven important species and several important varieties, and series *Pinnatifoliae* with only one

species. All should be planted about 20 feet apart.

Subgenus Ligustrina has only two important species and one variety and they should be planted 30 or 40 feet apart.

One plant of a kind will be sufficient in this collection.

(2) Next there should be a collection duplicating the above species and varieties arranged according to the country or district of their origin, and the date they were brought into cultivation. Here should be grouped together the three species from Europe, the eight from North China, the eight from West China, the three from Central and Southern China and Himalaya, the two from Korea and the one variety from Japan.

The above two collections will give two plants each of all the wild types of any botanical importance. The two arrangements give a chance for the study of botanical relationships and also of the geographical distribution, and the times when they were discovered by man and brought into our gardens. This is a comprehensive botanical foundation upon which to build the study of the garden lilacs which follow.

Collections of Garden Lilacs

The conception of a collection of garden lilacs is utterly different from that of a botanical collection. Botany is a science seeking to learn plant origins, relationships, natural evolution, differences and adaptations to natural surroundings, anatomical and other microscopic details. The botanist, concerned with divisions into families, genera, species and botanical varieties and forms, does not care whether the plant is well balanced and attractive, or straggly and ungainly. He does not care if the flowers are conspicuous or hidden by the leaves, whether the colors are bright and varied, or whether they are muddy toned, whether there is fragrance, no fragrance or just a bad smell. He is a scientist studying facts and trying to interpret them.

Horticulture on the other hand is an art. It walks hand in hand with the science of botany and builds its foundations upon it, but it is concerned with the human use wheth-

er this be for food, for chemical, medicine, textile or other types of manufacture, or for flowers for enjoyment. The flower gardener wants beauty. He wants plants which grow happily in his locality, which do not require unreasonable care or coddling. In the case of shrubs like lilacs, he wants them to grow reasonably quickly and symmetrically, to flower freely and regularly, to have bright colors and a wide color range if possible, and above all to bring him interest and pleasure.

For the gardener, therefore, lilac collections should show the important wild types from which cultivated varieties have sprung, should show the relationship of the various cultivated varieties to their wild parents, should show the history and evolution of these cultivated varieties from the wild types. Then great lilac collections should show the finest garden varieties splendidly grown, on a well drained hillside planted 15, 20 or more feet apart in fine soil and liberally fed.

To such collections can come gardeners from near and far for enjoyment, for inspiration, and to study which kinds seem to each individual the most pleasing and therefore the ones that individual should plant in his own home garden. And finally, there should be for the plant breeder and the advanced student or collector of lilacs a test garden of novelties conducted as a public service to determine which of many new kinds sent for trial will be worthy in the future of general planting.

These different collections of garden lilacs may be briefly stated as follows:

I. Species and Hybrid Race Collection

The most comprehensive collection of species and their varieties arranged according to their garden value and their value as parents, together with their resulting hybrids, including historical varieties and novelties for testing.

II. The Common Lilac—Historical Collection

The most comprehensive small collection of historical varieties, the best of their day though mostly now superseded.

III. The Common Lilac—Main Display Collection

The most comprehensive (not the largest) collection of the best varieties classified by season, by color, by origin and for garden purposes. As used here the term common lilac should include with the varieties of *Syringa vulgaris*, the earlier blooming hybrids of *vulgaris* and *oblata*.

IV. The Common Lilac—Novelty Test Collection

The most comprehensive (not the largest) constantly changing collection for the testing of novelties.

Let me elaborate on the above four different collections.

I. The Species and Hybrid Race Collection would include (1) the wild type of *Syringa vulgaris* and its ordinary garden form, and *oblata dilatata* which is probably the most valuable wild type of recent discovery. Here also would be *persica laciniata*. Following these would come other species like *microphylla*, *pubescens*, *meyeri*, *josikaea*, *reflexa*, *villosa*, *sweginzowi*, etc., and finally tree lilacs.

(2) Next should come some of these same species arranged according to their value as parents of hybrids with examples of the resulting hybrids planted near them. Fourteen such hybrid groups were enumerated in "Lilacs for America," together with the name of the type variety. Of these the following groups are certainly of importance—*hyacinthiflora*, *chinensis*, *henryi*, *nanceiana* and *prestoniae*.

(3) Historical varieties should include at least a few forms of *josikaea* and of *chinensis*, which were so widely planted in the last century as well as the type varieties of the hybrids considered above.

(4) Novelties for testing. This collection should include the resulting hybrids mentioned above except the old *chinensis* group. Restrictions of space will, however, prevent including too many varieties of one cross or from one breeder. In only one group, *prestoniae*, is the number at present unreasonably large.

II. The Common Lilac Historical Collection

can be and should be a monument to the work of plant breeders of a century or so ago, and at the same time a demonstration of how their work has now been so superseded by the work of modern breeders that their varieties are *now* no longer worthy of a place in our gardens. Yet without their work, our great modern improvement could not have been realized. So I feel strongly that they deserve all praise. Twenty or thirty varieties divided among singles and doubles will be enough both to give them due honor and to demonstrate the great modern strides forward.

III. The Common Lilac Main Display Collection should include only the most comprehensive (not the largest) collection of the best *and only the best* varieties or clons classified by season, (1) early, (2) midseason. In these seasons they should be grouped (a) by color classification for study purpose, (b) by country of origin, by breeder and by year of introduction for historical purposes, and finally (c) by color and height for landscape effect for garden purposes.

1. Early season varieties would include the *Lemoine giraldi* group typified by *Lamartine* and the *dilatata* hybrids of Skinner, classified by origin, and again for garden effect. These are important plants and deserve plenty of room.

2. The main collection contains, of course, the midseason well known so-called French lilacs. It should be displayed in several different ways. First, (a) for study purposes by color classification, one plant each of some 50 or 60 varieties chosen from the best one hundred recommended in "Lilacs for America." Second (b), also for study purposes one plant each of these same varieties grouped according to originator and year of introduction. Finally (c) these same varieties grouped to make the most attractive garden display. At least 100 and preferably 200 or more plants should here be used but no more varieties. At least one quarter of the plants should be white. Deep purples should be plentiful, and should be used near the whites for contrast. Pinkish varieties should be used near bluish varieties again for contrast. It is

not necessary to have uniformity of numbers by simply planting 2, 3, 4 or more plants of each variety. It will be much better to have as many as 10 plants of the very finest kinds and fewer plants of some of the others. The object of this collection is to impress upon the beholder the beauty of lilacs and their importance for the garden. I most strongly emphasize that this can be done much better by using 200, 300 or even 500 plants in only 50 or 60 varieties than by planting one plant each of 200, 300 or 500 varieties. Public collections in the past have suffered from the use of too many varieties. Stick to the best and leave it to institutions like the Arnold Arboretum to continue large variety collections as a matter of historical record. *Every horticultural purpose is served by planting the best and only the best.*

IV. To round out the usefulness of the above collection there should be a section (not necessarily open to the general public) for the testing of novelties. Such testing is badly needed. Every breeder naturally believes all his lilac seedling geese are swans. And equally naturally this is not true. Public test gardens can do a valuable service in separating the geese from the swans, the chaff from the wheat and the many poor, mediocre, fair, good and even *very fine but not distinct* lilac seedlings from the few that are spectacular and outstanding achievements.

This is no easy task. It cannot be done by any one person in any one place. But a dozen or twenty competent persons working on as many test collections in various parts of the country could, by pooling their information, do an enormous service to improve horticulture.

In these four great collections then I believe the Washington Arboretum can serve the botanist, the plant breeder, the advanced horticulturist and the plain dirt gardener. It can do this without attempting to bring together a collection of some fantastic number like five, six or more hundred varieties. It can teach by visual demonstration taxonomic botany, plant geography, the history of plant exploration, the history of plant breeding and

its results. It can show the gardening public the best fifty or one hundred or so lilacs from which this public can choose what it believes best. And it can encourage the production of improved varieties by testing new kinds and publicizing those that seem the finest. All these are worthy projects of public service worth the serious attention of the officials of a great public garden.

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Rhododendron Forrestii and/or *Rhododendron Repens*

I have in my garden plants bought under the names of *Rhododendron Forrestii* and *Rhododendron repens*. I have also sold plants sent to me under those names. But in my reading about these species I become more and more puzzled. I now submit the various opinions with which I have met:

- 1924—E. H. Cox, *Rhododendrons for Amateurs*—"Rhododendron repens appears to be the same plant as *R. Forrestii*."
- 1924—J. G. Millais, *Rhododendrons and the Various Hybrids, Vol II.*—Describes both plants at length, giving distinct colors to corolla and leaf. This footnote is added, "the plants sent out at first to various gardens under the name of *R. Forrestii* all appear to be *R. repens*."
- 1930—Rhododendron Society, *Species of Rhododendrons*—Lists two species, *R. repens*, leaves green and flowers bright scarlet—*R. Forrestii*, under surface of leaves dark purple and flowers dark crimson. Two varieties of *R. repens* are also described: *R. r. chamaethauma*; taller, with carmine flowers and *R. r. chamaedoron*, thin indumentum on undersides of leaves.
- 1933—W. J. Bean, *Trees and Shrubs Hardy in the British Isles, Vol. III*—*Rhododendron repens* is a synonym of *R. Forrestii* with *R. F.* var *chamaethauma*.
- 1939—Year Book of the Rhododendron Society repeats the information published by the Society in 1930.

It would be interesting to hear more of this from those who have knowledge and authority.

—ELSE M. FRYE.

Some Trees and Shrubs of Chile

F. R. S. BALFOUR

MY FIRST visit to Seattle was in February, 1900, when the good ship 'Flier' took me there from Tacoma. During the next four years I became fairly familiar with the trees and shrubs of the Pacific Coast, though I never was further north than the Bridge River, which flows into the Thomson River near Lilloet, or further south than Monterey. Then and in subsequent years I made several delightful expeditions in the Rockies, the Coast Range, the Olympics, the Siskiyou and Sierra Nevada when the search for plants was my chief lure.

Long ago I was anxious that an arboretum should be established on Puget Sound where it seemed to me that the climate was quite as suitable for the arborescent species of the Himalayas, New Zealand, Western China and Chile as any part of the British Isles. In many of our western counties the plants of those regions do supremely well. Perhaps I ought, however, to except those of New Zealand, as few of the species from those islands thrive well in Western Europe, although a good many veronicas and olearias can be seen in British collections. I was fortunate in finding the late Dr. Tenny a ready recipient for a fairly full set of the Western Chinese rhododendron seeds of Hupeh and Szechwan. I have learned with delight that, as I expected, the climate of Puget Sound has proved admirably suited to the growing of many of the almost innumerable species of that delectable genus. Of the 1,100 or 1,200 named rhododendron species of the world about 1,000 hail from Western China and the borders of Burma and Thibet. It is a grievous thing that scarcely any will flourish in the great American national collection of the Arnold Arboretum in Massachusetts. The climate of New England with its extremes of summer heat and winter cold also precludes the growing there of most of the trees and shrubs of the Pacific Coast. I believe every species from south of the equator refuses to survive, at least Professor Sargent told me so 30 years ago.

The object of this paper is to suggest to

all plant enthusiasts of Seattle that it is high time they introduced by seed many of the glorious flowering trees or shrubs of Chile. In our western Scottish counties of Argyll and Wigtown, where the rainfalls are abundant and the frosts are seldom if ever severe, the Chilean plants vie in their vigor and distinction with the splendid rhododendrons which seem to be as much at home as in their native high Himalaya and great mountain ranges at the headwaters of the Irrawaddy and Yangtse. The climates of Cornwall and West Ireland suit them equally well.

I would urge the advantage of growing the few I enumerate, they will repay many times the trouble and expense of acquisition. I do not deal with them in order of merit but as the recollection of fine plants of them come to my mind. I have the misfortune to live in that cold region of Central Scotland, known as the Southern Uplands where the occasional very severe frosts have proved too hard for most of the shrubs and trees of Chile. Indeed from January 3-6, 1941, when the temperature here fell to 46 degrees of frost Fahr. four of the five Chilean beeches succumbed, which heretofore had been regarded as quite hardy; two of them, *Nothofagus procera* and *N. Dombeyi*, were of my own introduction; I am happy, however, that my two 20-ft. trees of *N. antarctica* were quite uninjured. I have one *Araucaria* (Monkey Puzzle) grown from seed collected in Chile by William Lobb for the famous Veitch firm in 1844. The calamitous visitation of cold, unprecedented for 100 years, has browned most of its branches, though it is a tree of 75 ft. in height with a girth of 6½ ft. breast high. To those who live in a land so rich in the world's finest conifers as the Pacific Coast of North America there is little need to speak of Chilean conifers which are indeed small in number and far less in stature.

Araucaria imbricata (Pavon), the Monkey Puzzle, (or *A. "araucana"* as the botanists tell us we must now call it) is the only conifer from South America which reaches timber size in Europe. Its special interest for the folk of Seattle is that we owe its introduction to Archibald Menzies, the naturalist on Van-

couver's little ship the "Discovery," who, with Lieutenant Puget and the other intrepid sailors, was probably the first white man to see the site of Seattle. That was in May, 1792. After the first circumnavigation of Vancouver Island and visits to California and Hawaii, the explorers reached home via Cape Horn in 1795. While Vancouver and Menzies were lunching in Valparaiso with the Spanish governor, Menzies pocketed seeds of "pinon." From these five plants were raised on the voyage home and distributed in England. The last of them died at Kew in 1892.

The great coniferous families with which we are so familiar, *e. g.*, pine, fir, larch, cypress, thuya and spruce are all absent from the Southern Hemisphere. There is a genus of conifers, however, which is represented by one species each on the Pacific Coasts of both the Northern and Southern Hemispheres; it is that of *Libocedrus*, or "incense cedar," of which the only North American species is a splendid tree native to California, *L. decurrens* (Torrey) familiar to all of you who travel southward and have an eye for trees. In Chile there is another in *Libocedrus chilensis* (Endlicher). It does not reach so majestic a size in height and girth as the California tree but, like it, possesses the great merit in British eyes of being quite hardy in our island climate. There are a few other Chilean conifers to be seen in Great Britain, all of them, except *Araucaria* and the foregoing, demanding the milder climate of our West Coast regions. Those to be mentioned are *Fitzroya patagonica* (J. D. Hooker) brought to us by William Lobb in 1849. It grows from the coast north of Valdivia inland to the Andes. It is the sole member of its family and remotely related to the cypresses, which in America are called "cedars." I have seen a tree of it 60 ft. high at Stonefield in Argyll. *Saxegothea conspicua* (Lindley) is a tree of yew-like appearance which William Lobb found in 1846 in the dense forests of the Southern Andes. It was named in honor of our Prince Consort and there are a few specimens of 30 to 40 feet to be seen in Southwest England.

The only other conifers of Chile to be mentioned are *Podocarpus chilinus* (Richard) and *Prumnopitys elegans* (Philippi), both are yew-like and bear fruits which resemble small plums. They come from the Chilean Andes and make attractive evergreen small trees when grown in Great Britain where they are hardy enough. This digression into what Menzies would call "pinery" must not induce my readers to turn away before reading what is to follow, which is a descriptive enumeration of some of the most beautiful of the Chilean trees and shrubs. The gardens of Puget Sound would be furnished with them if some enterprising nursery firm in the West would set itself to supply them.

Encryphia pinnatifolia (Gay) (or *E. glutinosa* [Focke] as it is now called) has flowers produced in July and August, 2½ inches across, of four snow-white petals, the cup filled with multitudes of yellow stamens. It was introduced in 1859 by one of Messrs. Veitch's collectors. It likes peaty damp soil and abominates lime.

E. cordifolia (Cavanilles) is an evergreen species of slightly less hardness than the foregoing. It also comes from the Valdivia region. I am told that the great exports of Chilean honey are for the most part produced from its abundant showy blossoms.

A hybrid of these two, which has been named *E. Nymansensis* after its place of origin in Sussex, seems to possess the merits of both its parents. There are three great trees of *E. pinnatifolia* at Poltalloch in Argyll which were planted in 1891 and had reached 35 feet in height and 20 feet wide in 1939 when I last saw them. One such plant when smothered in its white blossom is ornament enough for any garden.

Tricuspidaria lanceolata (Miquel) is an evergreen with willow-shaped dark green leaves, among which hang its crimson, fleshy flowers, each on a stalk of two or three inches long. On the Northwest coast of Scotland it grows to a dozen or more feet and with such vigor as to be used as a wind-break from Atlantic gales. It is a tree with striking and remarkable flowers which makes it a most

desirable acquisition for the gardens of Puget Sound. The species may be known to some gardeners as *Crinodendron Hookerianum*. It is another of the fine things we owe to William Lobb; he extended his botanical exploration in 1848 to Oregon and Washington and brought to Europe the first seed of the western "red cedar," long known by the name of *Thuja Lobbii* though we have now reverted to the earlier name of *T. plicata*.

Desfontainea spinosa (Ruis and Pavon). This evergreen shrub will reach 10 feet in height and spread with a diameter of even 30 feet. It has spiny, holly-like leaves among which hang tubular orange-scarlet flowers from July till late autumn. It is another of William Lobb's introductions. It is preeminently suited to the climate of Ireland and Western Scotland. It is a plant of most striking aspect when laden with its orange yellow flowers.

The genus *Escallonia*, the species of which are all South American, has many very attractive members, none more so than *E. macrantha* (Hooker) which William Lobb introduced in 1846. It is an evergreen shrub with leaves which glisten darkly on the upper surface. It bears its funnel-shaped pink flowers in great profusion. It especially luxuriates near the sea. In Tresco, one of the Scilly Isles, dense hedges of it divide the fields of narcissus grown there for market, and shelter them from the frequent gales.

Philesia buxifolia (Lamarck) is still another beautiful shrub of William Lobb's introduction from Southern Chile: he brought it to us in 1847. The plant belongs to the lily family. In the soft, wet climate of West Ireland and Devon it flourishes and freely bears its bright crimson nodding flowers. It is not far botanically from *Lapageria rosea* which in its natural pink-flowered, as well as white-flowered, form is a green house climber or "vine" from Chile, well known to many of us in our childhood when its popularity was at its height. It is still regarded as one of the most beautiful of climbing plants but its beauty is of flower not foliage.

Berberidopsis corallina (J. D. Hooker) is another plant from Chile of similar habit and

hardier than the last "vine." (By the way that is an inaccurate but pleasanter term than our word "creeper!") It is an evergreen shrub of the greatest beauty. The alternate leaves are heart shaped and bright green above, bluish below and set with spiny teeth. The hanging flowers are round and have stalks one to two inches long which, like the flowers themselves, are of the brightest crimson. A great merit is that it continues in flower from July till the autumn. Richard Pearce, one of Messrs. Veitch's collectors, brought it to us in 1862.

Azara microphylla (J. D. Hooker) is the best known of the half dozen or so of the cultivated members of this Chilean genus. Messrs. Veitch's collector, R. Pearce, brought this elegant plant to us in 1861. The flowers are small and yellow with the scent of vanilla. It has small box-like leaves and it is an appropriate plant for a south wall. There is another species of the genus which we owe to H. F. Comber's botanical expedition to Chile in 1927.

Azara lanceolata (J. D. Hooker). It has narrow, evergreen, toothed foliage with small bright yellow, many-stamened flowers which remind one of mimosa. The fruits are violet, pea-like berries, conspicuously surmounted with a pointed style. Though Hooker described it from material found during the voyage of the "Beagle" in 1834, we had to wait till 1927 before seeing this very attractive plant in our gardens.

Berberis Darwinii (J. D. Hooker), I have small doubt, is familiar to all Seattle gardeners. I only include it as it is Chilean and one of the finest barberries known. It bears its bright orange flowers in April and May and has been spoken of by so preeminent an authority as W. J. Bean as being one of the best shrubs known. Though first seen by Darwin in the famous voyage of the "Beagle" in 1835, it was to William Lobb we are eternally indebted for the first seed. At Glenakil in Argyll I once measured a tree of it 24 feet in diameter of spread, 14 feet high and with a trunk girth of four feet two inches.

Drimys Winteri (Forster) is as early a discovery as any from South America. In 1578

Captain Winter, after whom it is named, brought home from the Straits of Magellan some of its aromatic bark in one of Drake's ships. It is an evergreen which does well in the milder Western parts of our islands. The flowers are in umbels of five or more and are of the purest white.

Pernettya mucronata (Gaudichaud) is a shrub with tiny evergreen leaves and is grown for the beauty of its pea-sized berries of white to darkest crimson which are profusely borne and not touched by birds. The plant spreads from suckers becoming a dense low mass. It is exceedingly hardy, as it well may be as it hails from Tierra del Fuego, one of the most inclement countries of the world, and the farthest south of any to produce woody plants. It was first brought to us in 1828.

Lomatia obliqua (R. Brown) is of such recent introduction as 1902 when the renowned naturalist, Mr. H. J. Elwes, brought it from Chile. In Great Britain it needs the western climate to show what it can do, though it has grown successfully at Kew since its introduction. There is another *Lomatia*, *L. pinnatifolia*, with handsomer cut-leaf foliage than the former which bears its rose and white flowers in Ireland and other mild regions.

Embothrium coccineum (Forster) is the showiest of all Chilean small trees. It is evergreen and its flowers are of the brightest scarlet which is a rare color in plants of our Northern Hemisphere. They are produced from the axils and in such prodigality that the sight of a flaming specimen in May is not one to be forgotten. It is one more of William Lobb's distinguished introductions; he sent seed in 1846. There is another closely allied species which we owe to the travels of H. F. Comber in Chile in 1927. It has more lanceolate leaves, not rounded like those of the former, and it appears to be of hardier constitution though both fare best in our milder western parts. A short avenue of these at Loch Inch Castle in Galloway is a pleasant recollection.

Calceolaria violacea (Cavanilles). This is a shrubby species of the Southern American

genus which has provided greenhouse plants with which we are all very familiar. It is hardy in our western country and ought to be put in a sunny place. It is an attractive shrub in midsummer when it is well covered with its pale violet flowers spotted with purple. Five or six members of the fuchsia family are native to New Zealand but the shrubby species we see in Western Scotland are from Chile. *F. Riccartoni* is there much used as a hedge plant and becomes a tall bush. In my own cold region it is cut to the ground in winter but each year grows again to a few feet high, one-year shoots being bright with their red and purple flowers till the frosts of autumn demolish them once more.

This short list of the desirable ligneous shrubs of Chile can fittingly be concluded with mention of a scarlet flowered herb which is so often seen from July till September rambling over hedges and cottages in Scotland as often by the ignorant to be regarded as a native! *Tropaeolum speciosum* (Endlicher), however, is Chilean and one of the best things that has reached us from that country. The pale green, quinquefoliate, delicate leaves and wreaths of brightest sealing-wax scarlet flowers are a never-ending delight in the gardens of the North. In Southern England it finds the soil temperature too warm and seldom luxuriates as it does with us. It belongs to the nasturtium family but is perennial and the twining growth survives our winters.

✓ ✓ ✓

Garden cleanliness is one of the best means of eliminating slugs. They congregate under tufts of grass, weeds, ground cover plants and low, bushy species during the daylight hours. Also, if you resort to any hand picking method, as a supplement to the use of a good bait, you can attract many of these pests by placing half an orange or half an apple at some strategic point in the garden. The fruit attracts them and they can be easily disposed of late in the evening or very early in the morning.

✓ ✓ ✓

Visitors to the Arboretum nursery should see the two plants of *Libocedrus chilensis*, mentioned above by Mr. Balfour.

Primroses
IDA SCHIBIG

THE members of the genus *Primula* are not only fascinatingly beautiful but they can be grown easily by anyone and are suitable in nearly every garden. These facts are rapidly being recognized and the apprehension that formerly (and erroneously) surrounded this worthy group of plants is gradually being dispelled. Considering that the climate of the Pacific Northwest is quite ideal for growing the flora of the temperate zones, a great number of the many species of *Primula* can be chosen that will prove hardy and completely satisfactory in every way. As with any group of plants, primroses make certain demands upon their environment, especially as regards soil, situation, sunshine, shade and general cultivation. By applying in a practical way a few basic principles anyone can grow primroses to perfection.

Primula species can be divided into three groups, namely, the Alpines, from the European mountains; the Asiatics, which generally can be sub-classified as bog primulas, and the *Polyantha* and *acaulis* types called woodland or border primroses, which are always popular and the best known of the entire genus. These last named have been cultivated quite extensively in the Northwest.

Although the saxatile or Alpine species are alluringly beautiful, the group will most generally appeal to the rock gardener or *Primula* specialist. For average garden purposes the Asiatic and woodland primroses are most desirable. In particular the bog species which typify the Asiatics represent some of the finest of the entire clan. They are spectacularly beautiful, not too precise in regard to their cultural demands, and are in every way good, reliable plant material. Unfortunately, they have not as yet been given their due recognition by the average home gardener in the Pacific Northwest. This group, above all, should be grown by those desiring fine primroses.

The two most common methods used to propagate the species are, first, by seed, and second, by division. There is also a third

way, by offsets, but this method is seldom used as only a few of the European saxatile species lend themselves to this system.

When specimen plants of the border type are desired, propagation by seed should be resorted to, as plants thus grown attain a cultural perfection not acquired by other methods. This excellence of quality is achieved during the second flowering season, after which the plants begin to slowly deteriorate, losing that quality of vigor that makes the two-year seedling so desirable. This loss of energy is usually due to an old and crowded root system. From the central root stalk the rhizomes emerge and form many individual crowns, and the health of these crowns is in direct ratio to the condition of the roots. Only young and flourishing roots produce sturdy and vigorous primroses. Growing the plants from seed is not only the best way to obtain good plant stock, but it is a fine method by which to study their culture. It is also very fascinating to watch for new or unusual bloom.

The first requisite is to obtain fresh seeds from reliable growers who have a reputation for handling good strains. To be assured of the highest germination, seeds should be planted immediately after ripening. However, another time that is perhaps more preferable than the summer is in the early spring because the seedlings are afforded a much longer growing season, making it possible for the young plants to become better established before winter.

Planting seeds in pots not only facilitates handling, but the seeds may be watered from below by setting the pots in a pan of water. This method is superior to overhead watering as the seeds are less likely to be disturbed.

Clean, porous pots should be filled one-third or one-half full of broken crocks or gravel to insure the perfect drainage which primrose seedlings require. This fact cannot be stated too often. The drainage material must be covered with some substance such as sphagnum or peat moss to prevent the soil from being washed through the drainage hole. A good seed-soil mixture consists of one-third each of sand, leaf-mold and fibrous loam. It should be finely screened and the pots should

be filled to within half an inch of the top to give the tiny seedlings enough air circulation to prevent damping-off. Gently firm the soil and sow the seed thinly on the surface to prevent a crowded condition after they have germinated. Failure is often the result of sowing too deeply, so a light sprinkling of sand just heavy enough to hold the seeds in place will suffice. Place the pots in a shallow pan of water until the soil becomes thoroughly wet. Overhead watering should be done only with an extremely fine spray. From the day of sowing until the time for pricking out, the soil must be kept moist at all times. Place the pots in a cold frame and shade them to keep out the direct light. Close the glass sash except on extremely warm days.

When the tiny seedlings appear, gradually expose them to more and more light and slowly to the direct sun. When the second set of true leaves forms they are large enough to transplant into flats filled with soil composed of the same ingredients used in the pots. When the plants have developed a sturdy tuft of leaves they are ready to be set into open ground, which should be early enough in the season for them to become well established before winter. Seedlings started late are better if left in the flats during the winter and planted to permanent locations in the spring. Nearly all primulas grown from seed will bloom within two years.

When primrose plants begin to show a loss of vigor because of an old and crowded root system they must be divided and replanted so that they may survive as healthy and hardy plants that will be capable of producing rich foliage and flowers. Propagation by division should be resorted to immediately after blooming. The divided plants are then able to establish themselves sufficiently during the summer to withstand a severe winter without any real damage. Plants that are divided in the fall are not able to grow enough to insure choice spring bloom.

To make it possible for the divisions to duplicate as nearly as possible the healthy root condition of young seedlings, which is an abundant growth of new roots, the old roots should be entirely eliminated, leaving only

the tiny new rootlets which form close to the crown of each individual rhizome. To do this the plants to be divided should have all the soil shaken from them. Break away each section or rhizome, saving only the most robust. With scissors cut away all of the old growth. Cut the foliage within an inch or two of the crown. Plant each crown in deep, rich soil, approximately eight inches apart, water well and keep the ground thoroughly moist thereafter. If properly handled the individual division or rooted cutting will form a fine plant by fall and often within a period of a few months will send forth bloom.

To grow primulas successfully there are several basic factors concerning the cultivation that should be understood. The correct location as regards sun and shade, soil conditions, drainage and fertilizer is particularly important.

Primroses are definitely plants for moderately cool temperatures. They resent excess exposure to sun and cold, and always do best when they are sheltered from the north and shaded from the south. In this situation they are also protected from the dry winds which they resent. The woodland species, such as *P. acaulis*, *P. officinalis* and *P. Polyantha*, grow better where the air is moist and still.

The border and Asiatic primroses will accommodate themselves to various soils but they prefer one that is rich in humus. If the soil is thin and contains little nourishment, humus in various forms will give it a heavier and richer texture. Well-rotted cow manure should be trenched in if the soil is really poor. However, caution must be exercised in the use of this kind of fertilizer, especially if it is green, as it might destroy the plants by burning them. A fertilizer that is too high in nitrogen content should be used prudently. It tends to produce a lush and spindly growth that will result in weak stems and a sparseness of bloom. The majority of primulas do best in a moderately rich soil that is slightly on the acid side.

Moisture and drainage cannot be considered in generalities as these two factors can spell either success or failure in growing primroses. Although they want sufficient water in the

summer to keep them continually moist, they demand an absence of excess water in the winter and they must have sufficient drainage at all times so the water will not stand and become stagnant. If the soil is too heavy to allow a free passage of water an addition of coarse sand or fine stone chippings will help to lighten it. Even though the surface may appear well drained, the soil underneath might be too wet for the health of the plants and good drainage should be provided. To help retain the moisture in the soil during the dry season a top dressing of peat moss is beneficial.

The group of primulas collectively known as Asiatics will add a startling fillip to our summer gardens and in some instances they will surpass or at least equal the popularity now commanded by the early spring blooming Polyantha and acaulis types. Contrary to the definition of primrose, "the first spring flower," which is derived from the Italian phrase "*flor de prima vera*," many species are summer and fall blooming. As worthy representatives of a later blooming period, the Candelabra and Sikkimensis types are outstanding. One fact which particularly commends them is that they provide a succession of primula blossoms through a large part of the year.

One thing in their favor is the ease with which most of them may be grown. Another is their suitability as garden material in the natural settings that typify our Northwest and the entire coastal region as far south as northern California. A great many of the species included in the Asiatic classification will perpetuate themselves by self-sown seed, and when grown in deep, rich, moist soil in a shaded position during the intense heat of the day, excellent results will be obtained.

The great plant hunters, Forrest, Ward and Wilson, describe them as growing in the high Alpine meadows along a trickling stream or in a bog that has drainage enough to clear itself. (Perfect drainage is a condition demanded by all primulas.) As desirable as such locations are, it is fortunate that the same extravagant conditions need not be duplicated in order to grow these charmers of the primrose clan. Like all our other garden flowers that were introduced from far away lands,

they will grow and flourish under ordinary good garden conditions.

One of the most familiar species is *Primula japonica*, which produces a tall scape arising from a tuft of large, pointed, lettuce-green leaves. The superposed flower umbels of numerous purple shades, as in the type plant, are delightful. The hybrids and strains of *P. japonica* are a decided improvement over the wild type in that the color range is more extensive. There are about a dozen named strains in which the colors vary from white to the dark crimson of the species. Among the better strains are *alba*, a pure white form, and Miller's Crimson. *P. japonica* is prone to cross with other species freely and should be kept segregated in order to prevent the others from being vitiated, if seed is saved. This primula will flower in May and June, year after year, adding joy to anyone's garden.

Lovelier even than the Japanese primrose are the similar summer-blooming Candelabra types, *Primula Beesiana* and *P. Bulleyana*, and their hybrids, the Bullesiana types. The flowers of the type plants of *P. Beesiana*, as collected in Yunnan, are a luminous plum purple with an orange eye, and are slightly fragrant. *P. Bulleyana*, a rich orange shade, is one of the finest colors in all the Asiatics and is considerably larger than *P. Beesiana*. When *P. Beesiana* and *P. Bulleyana* are grown together the resultant seedling progeny will include nearly all shades of orange, yellow and salmon pink besides the original colors of the types. This is one of the fascinations of primrose gardening.

Another fine purple is *Primula pulverulenta*. This charming species is the parent of many good hybrids and strains and, like *P. japonica*, the original plant has been surpassed by its numerous progeny. Outstanding of these is the Bartley strain, which consists of all shades of pink, and when grown in a well-shaded position among rhododendrons and ferns the pink flowers, enhanced by the gray meal on the stem, are truly a delight.

One of the better known hybrids of *Primula pulverulenta* is *P. Red Hugh*, a cross with *P. Cockburniana*, which latter is a fiery orange and more diminutive. Red Hugh is an ex-

tremely vivid coppery orange and is very striking when planted in bold masses.

Less rugged appearing, although perfectly hardy, is *P. Aurantiaca*, a reddish orange, *P. Burmanica*, a crimson purple, and *P. Chun-gensis*, a rich buff yellow. All three will do particularly well if a shady, moist section in a rockery can be provided.

Primulas of the Sikkimensis group include *P. Sikkimensis* and its near relative, *P. Florindae*, which both are fine acquisitions. *P. Florindae* is the giant of the primula tribe. When it is given good soil in a moist situation that is shaded from the afternoon sun the citron bells of cinnamon scent will top a scape of three feet or more. The flowers are very numerous and are carried on long pedicels of varying lengths which form a cluster that is reminiscent of a bursting skyrocket. It flowers in August.

P. microdonta is a very beautiful species, exceedingly variable in the tints of the blossoms. The flowers which appear in July are fragrant and range from pale yellow to white, sometimes tinged with violet and powdered with white meal in the throat. Variety *alpicola* has pale yellow flowers in June. Variety *alpicola violacea* has flowers of violet purple or wine with white meal in the throat also.

P. secundiflora and *P. vittata* are very similar and with *P. Florindae* comprise the most reliable forms of the Sikkimensis group. They are brimful of quality and breeding. The flower stems rise very erectly from a rosette of glossy narrow leaves to fifteen inches or more and terminate in vertically hung bells of rich crimson purple.

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Two excellent summer-flowering shrubs that can be used to advantage in Puget Sound gardens are *Olearia Haasti* and *Cassinia fulvida*. The latter has particularly colorful foliage. The stems and lower leaf surfaces are covered by a rich brown tomentum. Both these plants are unusual for another reason—they belong to the daisy family. One does not often encounter the shrubby species in this family.

Twelve

Wild Flowers of Central Washington

RAY L. GARDNER

RAIN clouds from the Pacific Ocean lose their moist cargo as they rise to cross the high Cascade Mountains. Rainfall sharply diminishes as the clouds drift on over the eastern slopes. The cool, moist climate at the summit changes in the descent to the hot, semi-arid central plain. Spring flowers thrusting their way up beside melting snow on the mountain tops may be a month behind their relatives half-way down the mountain, and the flowers on the sage flats have bloomed and gone. Great variability of soils and climate in this area accounts in part for the remarkable variety of wild flowers which occur here.

The charm and beauty of the alpine flowers is well known. Their position high on the backbone of the state, along sheer cliffs and among barren rocks adds a bit of drama to their unique form and coloration.

Mountain bumblebees struggle into the intense blue trumpets of *Gentiana calycosa*, as she cools her white roots in glacial seepage. *Silene acaulis* is a pink-starred emerald set in gray stone pinnacles high over eternal ice rivers. *Penstemon rupicola* blooms rear alertly, their pink translucent, snake-like heads closely guarding their cleft in the crag. *Mimulus lewisii* stands erect in icy torrents, and blows her large rose trumpets. Anemone and glacier lily march their battalions beside melting snows, deploying among tall, graceful squaw-grass and striking white hellebore. Orange, scarlet, and crimson Indian paintbrush are fresh-dipped in nature's secret paint pots.

But to leave the many other petulant beauties, and start down the long, colorful slope, a pause near the old gold diggings will divulge two very distinctive plants, which are native only in one small area. *Douglasia dentata* blooms shining magenta red in tiny close mats on broken talus in semi-shade. *Lewisia tweedyi* grows fat, shiny rosettes of spoon-shaped leaves in mould and broken stone on very steep, shaded slopes. Scapes shoot out from among the fat leaves and carry proudly

several large, waxy, lily-like flowers. There may be several dozen blooms on one large clump, and the shell pink flowers and rich leaves are beautiful. The stems are tucked under the leaves after blooming until the seed matures, perhaps to protect the seed from deer or birds.

There are lupines and other showy flowers everywhere on the open eastern slopes, but some localities display rich tapestries of colorful bloom, changing as the season advances, and later varieties take the place of early species. Patches of clear golden arnica glow, thick as grain in the field. Pink, blue, yellow, purple and white lupines run riot. There are airy delphinium and clumps of soft blue polemoniums, and mats of starry, dark blue *Veronica cusickii*. Creeping phlox, in great white to lavender or pink mats, dots the grasslands. White-faced cattle and wild herds of wapiti thrust aside tall hyacinth-like camas to nuzzle the new grass, or browse upon fragrant mock-orange bushes.

The canyon thickets are creamy with ocean spray or fragrant with white bloom of wild hawthorn, cherry, and service-berry. Delicate twinflower and purple vetch, and tight-fisted orange Columbianum lily, with an occasional furtive lady's-slipper grow in the heavy shade. Indian moccasin and white and yellow dog-tooth violets grow on bare forest duff.

From barren slopes sprout erect, narrow-leaved, six-inch stems, topped with the most amazing pink and blue bells, of the cormous *Mertensia pulchella*. Velvet golden cloth of the tiny annual *Crocideum multicaule* covers acres of high pasture lands. Dry stream-beds may be embossed with woolly golden mats of *Eriophyllum multiflorum*, and rich masses of royal purple wild shrub mint. In sandy stream beds under aspen and oak wave graceful scarlet trumpets of the biennial *Gilia aggregata*, and large waxen blue foxgloves of *Penstemon glaber*.

Moisture accumulates on the sage-covered plains and the ranges of naked hills through the winter, and lovely desert cinderellas spring from hidden bulb, corm, and seed, and from dwarf, dried shrub, to make magic

flower gardens almost overnight. Children joyfully gather handsome bouquets of the fragrant Johnny-jump-up, *Viola trinervata*, and hold clusters of the buttercup, *Ranunculus glaberrimus*, to reflect on shining faces, to "see if you like butter."

The grass-widow, *Olysynium grandiflorum*, flaunts rich purple bells. Pink *Dodecatheon*, shooting-star, with its rich, fruitlike fragrance, grows among tall, slim, wiry stems, topped with the blue-white, or purple wobbly bells of *Hookera*, the wild desert hyacinth. *Allium acuminatum* is tiny, pink, and smells of garlic. *Viola nuttallii*, the yellow, scentless violet, has slender leaves and long stems. Very exotic appearing, with pointed purple sepals and petals, wild desert tulips include several species of *Calochortus*. *Capnorea lasiantha* holds good-sized, open, blue and white bell flowers on woolly, low rosettes.

Dried prickly mats of dormant desert phlox come to life and become soft cushions of clear white to lavender stars. There are many very handsome desert daisies, including many species of *Erigeron*, forming soft clusters or shining golden pincushions, such as *E. filifolius*.

Lewisia rediviva is a most amazing, as well as beautiful, dry-ground flower. It is widely distributed, and is known as rock-rose and bitter-root. Indians gather the roots for food, and use quantities of them. Their roots lie dormant in dry gravel or shale all through the year, to burst into bloom, and suddenly cover bare ground with clusters of shell-pink water-lily blooms as much as several inches across. The flowers seed and bloom and slender leaves disappear as soon as the seed has scattered.

Watered-silk, pastel roses tempt the unwary from among the wicked spines of the prickly pear cacti. Short spines are patterned over perfect round balls of the globe cacti, and rich crimson flowers shoot up from the center of each globe. Jackrabbits gingerly upset them and eat all but the skin and spines, leaving the hollow shells.

Eriogonum thymoides is an exquisite, flat-topped, little shrubby buckwheat which sprouts delicate yellow to red balls of bloom.

Other species vary from many shapes and sizes of red- and yellow-flowering shrubs to astonishing perennials with large basal leaves and good bloom clusters held high. They all require desert conditions, seemingly.

Balsamorhiza or balsamroot grows where there is dry ground, and that means over the entire central plain, and far up the eastern mountain slopes. There the great clumps of coarse yellow sunflowers contrast well with the ever-present blue lupine. In the autumn their large, dried leaves persist, and rattle when touched, warning deer and other game of the hunter's approach. *Gaillardia aristata*, resembling common garden coreopsis, generally is accompanied by several good blue species of pentstemon, of which the state boasts many. Wild *Iris missouriensis* thrives among giant clumps of wild rye grass, near streams and sub-irrigated ground. The shiny leaves of Oregon grape color scarlet and orange over portions of the dark green of their surface, and show for considerable distance. The light, ferny-green foliage of *Pentstemon richardsonii* colors vividly as the last shell-pink trumpets fall from the airy branches, to enliven rocky roadside cliffs from late spring to fall. Sandy stretches of the hottest plains are brightened by scarlet wild geranium, *Sphaeralcea muroana*. Large pastel yellow and pink silk flags wave all day and belie the name of the desert evening primrose, *Oenothera biennis strigosa*.

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In late February and early March an effective display of color can be had from a group of *Cornus mas*, the cornelian cherry. Do not use the species for specimen purposes, however, unless you can provide a dark, ever-green background against which the light yellow flowers will show to best advantage.

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A little-used broad-leaved species which gives good texture harmony with the larger rhododendrons is *Mahonia Bealii*. Its large inflorescence of soft yellow flowers is quite attractive, too. A few nurseries in the Northwest are beginning to carry it.

Growing Bulbs in Washington

HOWARD E. ANDREWS

IF ONE had the time and space that would be required to tell in detail the fascinating story of the bulb industry of the state of Washington, it would sound almost like some of the amazing gold discoveries of years past.

Bulb growing, on a commercial scale in Washington, is really in its infancy. The growth and expansion has been both steady and permanent. The acreage has not increased by leaps and bounds but has actually been expanded by only six or seven hundred acres over a period of ten years. In 1935 a total of 1,300 acres of land was devoted to the growing of narcissus, iris, and tulip bulbs. Today the total area is in the neighborhood of 2,000 acres.

When one stops to consider that approximately 50,000 narcissus bulbs are planted in each acre, or 250,000 iris bulbs, or around 75,000 tulips, one begins to appreciate the vast quantities now being produced. Also when one stops to realize that nearly 200 car loads are shipped every fall, here again the magnitude of the growing industry begins to manifest itself. This quantity will amount to almost 75,000,000 bulbs. Again as comparison—in 1939 the importation into the United States from Holland amounted to approximately 145,000,000 bulbs. Here we see, by these figures, that our state alone produces over 50 per cent of the total that was formerly imported.

Now that we have a fair estimate of the acreage and of the quantities produced let us turn our attention to the equipment required to handle such an annual output.

Bulb growing, in every phase of the work, is a highly specialized industry. The equipment in machinery and skilled help is no small matter. Statistics for the year 1939 show an investment of over \$875,000 in bulb equipment. Most of this equipment has been built solely for the bulb industry. Regular farm machinery, such as tractors, plows, cultivators, etc., is obviously essential but then there are diggers, planters, graders, fumigating chambers, hot water vats, storage sheds,



spray machines, etc., which are all indispensable to the industry and peculiar to it.

Labor is an essential factor in the production of bulbs. A great deal of skilled help is required in the fall season when the grading and sorting of the millions of bulbs is accomplished. Maintaining a full crew, twelve months of the year, is rather difficult, due to the fact that the great bulk of daffodils, irises and tulips are now planted by machinery. During the spring and summer months the regular field cultivation is carried on by means of tractors and cultivators so arranged and spaced as to take care of four rows. Spraying is done in the same extensive way. By such methods a great many acres can be covered and kept clean with a comparatively small force. In the growing of Wedgwood iris a great deal of hand weeding is required during the growing season. To be sure, this is also true of tulips and daffodils, but irises require especial attention to hand weeding if a good crop is expected. Hoes and various types of weeders are employed in weeding tulips and daffodils but the fingers seem the best method when it comes to the iris.

At this point let us stop a minute and consider the immense amount of spraying that is necessary to produce clean, first-quality bulbs. Like any other crop, the plants are subject to a variety of diseases and insects. For a better understanding of these pests and diseases let us consider the three main types, namely, daffodils, tulips, and irises, to see what is required in the way of sprays and treatments to combat the injurious pests that attack and destroy them.

Looking at these individually we find that the daffodils and narcissi are subject to the following: a fungus causing "fire;" a basal rot; insects such as tarsonemus mite; narcissus bulb fly; lesser bulb fly; nematodes, and virus diseases.

Now to boil these down: the fungus causing "fire" attacks the foliage, causing it to turn brown. This very effectively stops the development of the bulb beneath the ground. The spore of the "fire" fungus germinates and develops rapidly in a moist environment. Its spread is very rapid and great damage

may result in a short time unless it is stopped. The recommended treatment is to spray with Bordeaux 4-4-50 with $1\frac{1}{2}$ pints of Penetrol to 50 gallons of water. The spray must be applied just as soon as diseased spots appear on the foliage. What is termed "spot" spraying can be done, but the best way is to spray the whole tract as soon after the blooming period as possible. If "fire" is discovered it is best to rotate your plantings and above all never cultivate or work in the field when the foliage is wet.

Basal-rot is a fungus disease which affects the basal plate of the bulb. Many thousands of bulbs are lost every season due to it. It spreads very rapidly during storage and the affected bulbs soon become soft and mushy. The best way to test a bulb for basal rot is to press firmly around the base with the thumb. If a soft, chocolate-colored spot is encountered, a simple cut into it with a knife will expose the rot. If left in contact with other bulbs it does not take long for all of them to become affected.

Several treatments are recommended but they apply only to the grower's planting stock. All bulbs offered for sale are very carefully inspected for basal rot and infected ones are eliminated before they can be shipped. The commercial bulb grower can prevent the spread of basal rot by any of the following treatments, though their use should be avoided by the home gardener since they may damage the flower bud inside. For the prevention of basal rot a cold dip of Old 2% Ceresan—1 lb. to 8 gallons of water. Submerge the bulbs for a period of one to two minutes. Treat bulbs as soon as they are cured (two to six weeks after digging). Or, the hot water treatment using Old Ceresan at the rate of 1 lb. to 25 gallons of water for $1\frac{1}{2}$ hours at 110° F. Then again you may treat your planting stock as follows: formaldehyde added at the rate of one pint to 25 gallons of water. The treating time is $1\frac{1}{2}$ hours at 110° to 111° F. Formaldehyde dilutions as low as one pint to 50 gallons of water may be used. This also controls nematode.

Remember that basal rot is serious and, although the foregoing treatments are not

complete preventives, they have been found to check to a large degree the spread of this fungus.

For your guidance the following precautions should be practiced: keep the bulbs cool; keep them well ventilated. Dig and place them in *cool* storage as soon as possible. Plant them in cool weather, in freshly opened cool soil. Cure them under cover. Plant as soon as possible after treatment. Sterilize all trays. Sort out infected bulbs and destroy them. Rotate plantings regularly. Handle the bulbs carefully and, in particular, avoid bruising them.

The next important enemy of daffodils and narcissi is the round worm or nematode. This pest is so small that it cannot be seen by the naked eye. It is found in the bulb during the dormant period and will follow the growth as it advances in the spring. It infests the cellular tissues of the plant. During the growing period the effects of nematodes take the form of swellings, or of severe distortions on the foliage. Also during this period a very careful field inspection is required by the state horticultural inspectors since our state quarantine does not permit the shipping of any bulbs that have not been field inspected and found free from nematode.

It is timely, at this point, to mention a few facts pertaining to the quarantine law as it relates to narcissus and daffodil bulbs. It is known as State Quarantine No. 5 and its main purpose is to prevent the introduction and spread of nematodes within our state boundaries. A series of strict regulations, outlined by the bulb growers themselves, and enforced by the State Department of Horticulture has been put into effect. They govern both the incoming shipments containing narcissus or daffodils as well as all intra-state shipments. No doubt some of the readers of this article have been disappointed and nonplussed when they have discovered that they could not dig daffodils from their own yard and send them, by mail, to some garden lover in another section. Unless the bulbs have been inspected during the previous growing season and found free from nematodes, they cannot be sold or shipped. If one contemplates sell-

ing or shipping any daffodils from their plantings your nearest county horticultural office should be notified so that the plants may be inspected during the growing period. The ideal time to have them inspected is when the plants are in flower, or shortly after the bloom has dried up.

Nematode-infected stock should be treated for four hours in hot water at 110° to 111° F., using one pint of formaldehyde to 25 gallons of water. The treatment should be given immediately after the 10-day drying period which follows digging. Late treatments are injurious.

The Tarsonemus mite is a small insect that eats its way into the neck of the bulb and destroys the flower. The hot water treatment of formaldehyde, one pint to 25 gallons of water for 1½ hours at 110° is recommended.

Methyl bromide fumigation is highly recommended for control of both fly and mite, using 3 lbs. to 1,000 cubic feet for four hours at 70° F. This requires a special chamber and should be used with great caution.

The narcissus bulb fly is another insect which does extensive damage. The female adult lays her egg on the foliage close to the ground line during the growing period. As the egg hatches a tiny larva makes its way to the base of the bulb where it begins to eat inward toward the center. The hole made by the larva at the time of entry is very small but as it eats away the central part of the bulb it increases in size until it reaches ½ to ¾ of an inch. Fumigation with methyl bromide is recommended as also are sodium cyanide and calcium cyanide.

Virus diseases such as "mosaic" and "decline" are to be found in most daffodil plantings. Plants with streaked foliage should be rogued out early and destroyed. Decline is revealed by the following symptoms: "paper tip," "white streak," and "purple streak." Here again roguing is recommended.

Turning our attention now to the bulbous iris we find that here, too, our troubles arise chiefly from diseases that are difficult to combat. Diseases that seem to suddenly spring up and attack plant life, like "fire" and

rot, are always danger points in the growing of any crop and require very careful handling to prevent spread or increase. *Heterosporium* or "fire" is the chief enemy of iris. Bordeaux mixture used as a spray, starting early in the spring, has been found the most efficient way to combat it. A 4-4-50 solution with 1½ pints of Penetrol to 50 gallons of water has been used successfully. Complete coverage and regular spraying to protect the new growth are absolutely necessary. Avoid planting bulbous iris near the German iris types.

The growth and interest in the growing of tulip bulbs has proven that our Puget Sound climate and soils are ideal for their production. Acreage has steadily increased and to drive through the Puyallup Valley during the blooming season reminds one of the fields in Holland. It is a rare sight indeed to look across twenty or thirty acres of tulips in bloom toward the imposing Mount Rainier in the background.

The areas surrounding Mount Vernon, as well as those in and around the Puyallup Valley, comprise the main centers of the tulip bulb industry. It is true, however, that there are several other important growers located elsewhere in our Pacific Northwest.

In the tulips we are confronted with another fungus disease known as *Botrytis* or "fire." *Botrytis* causes the foliage to turn yellow and dry up in the early stages of growth. The spores are found in masses on the leaves, giving the appearance of a mildew. If one finds such a mass it is wise to cover the entire plant with a tin can to prevent the spores from spreading about. Spot spraying is effective in such a case; use a 2-2-50 Bordeaux spray with Penetrol added at 1½ pints to 50 gallons of water. Copper oxalate at the rate of 3 lbs. to 100 gallons has also been found to be effective. A new spray material, known as Fermate, has been tried and the results have been quite encouraging.

In the last two years another new material, called Thiosan, has been found to be superior to several of the old standbys. In 1943 Fermate was tested and compared with Thiosan, Bordeaux, copper oxalate, silver nitrate, and a sulfur dust. Fermate again controlled the

Botrytis blight fungus better than did any other material. Bordeaux and Thiosan gave about the same results, but Bordeaux produced considerable leaf-burning. Fermate caused some burning when applied with a knapsack sprayer in the 1943 tests, but none when it was applied with a power sprayer to commercial fields by two growers. This condition was probably due to a lighter and more uniform deposit in the latter case as compared to a rather spotty deposit with the knapsack sprayer. Both growers reported good control of the blight in their trials. One of them also stated that Fermate in dust form appeared as effective as in a spray.

Fermate, being black, badly discolors the flowers and leaves when applied with a knapsack sprayer. Thiosan, however, is a light blue in color, produces a less noticeable deposit and therefore appears preferable for home flower gardens. The Fermate, because of its superior control quality, is recommended for trial in commercial fields in 1944. Four applications of a 2 lbs.-to-100 gallons solution at 10-day intervals, beginning as soon as the leaves are three to four inches high, should be adequate under most conditions.

It is our understanding that the production of Fermate, as well as Thiosan, though its use has been restricted, has been increased and it is possible to secure limited quantities. It is suggested that, if you want to try either of them, you contact Van Waters & Rogers of Seattle, Washington.

There are several *don'ts* to follow if one wishes to grow tulip bulbs successfully. For instance, don't dig any tulips until the foliage and stems have been removed. Also don't plant the bulbs until all of the old flowering stalks and other portions of the old bulb have been removed. Don't plant tulips twice in succession on the same land, and then, if you are growing tulips to sell the bulbs, pick off the blossom or tulip cup, leaving the stem, as soon after opening as possible.

Mosaic, a virus, is also common in tulips. Roguing has been found the best method of elimination. The potato aphid and the peach aphid are largely responsible for the spread

of this disease. Isolation to a distance of 100 yards is considered safe.

It seems that a large part of this bulb discussion has dealt with insect and disease control, but in order for successful bulbs to be grown and to further the bulb industry it is necessary that these facts be known. Bulbs, like any other crop, must be kept clean in every way in order to insure success. Otherwise, if neglected, it would not take many years before a great potential industry would be wiped out. This has already happened in other parts of our country and every effort should be put forth to forestall such a catastrophe here.

The information regarding the control of pests and diseases of bulbs for the Pacific Northwest contained in this article was compiled by the Bureau of Nursery Inspection Service, Department of Agriculture, State of Oregon, and the Nursery Inspection Service, Department of Agriculture, State of Washington, and is based on the findings of the following research agencies:

Bureau of Entomology and Plant Quarantine, U.S.D.A.; Division of Nematology, Bureau of Plant Industry, U.S.D.A.; Oregon Agricultural Experiment Station, and Western Washington Experiment Station.

All growers, as well as all lovers of bulbs, feel deeply indebted to these various departments which have given so many hours of research in order that better and bigger bulbs can be grown to adorn our gardens and homes, thus spreading the message of joy and beauty that only flowers can bring.

Through the untiring efforts of both the research agencies and the growers the notable expansion of the bulb industry in our Pacific Northwest has proven that the production of all types of bulbs is assured. Thus another important industry with a promising future has been created.

1 1 1

Several species of the genus *Eucryphia*, mentioned prominently by Mr. F. R. S. Balfour in his current article on Chilean trees and shrubs, are now growing in the arboretum lath house and nursery. They are *Eucryphia glutinosa*, *E. cordifolia*, and *E. nymansensis*.

Useful Herbs

MRS. F. S. FLICKINGER

BOTANICAL dictionaries define an herb as a plant whose stem dies down to the ground after flowering, in contrast to the trees and shrubs which have woody and persistent stems. The word as used in this article, however, is applied to that class of plants, some portion of which, because of aromatic or healing properties, has been used for medicine, perfume, or flavor. The Herb Society of America has chosen to define it even more generally as "any plant that may be used for pleasure, fragrance, or physic."

The list is legion and the uses varied. Basil, chervil, sweet marjoram, and thyme are classified as fine herbs because they are the more domineering in flavor, with a long tradition as aristocrats of herb cuisine. Sweet basil is an annual, growing twelve to fifteen inches. There are two species commonly cultivated, both natives of the East Indies; the sweeter or larger basil, *Ocimum basilicum*, and the bush or best basil, *Ocimum minimum*. A light touch of it adds piquancy to salads and soup. Mock turtle soup is indebted to it for its distinctive flavor. The seeds should be planted in March indoors, or later out-of-doors, and transplanted into well-worked soil in rows eight inches apart.

Chervil is a cousin of the parsleys, with dainty fern-like foliage. The flavor is very delicate. "Chervil," says Gerarde in his "Histories of Plants," "is very good for old people that are dull and without courage—it rejoiceth the heart." In butter sauces for eggs and poultry dishes it is quite palatable. Basil, chervil, and chives make a tasty combination.

There are four species of marjoram cultivated; sweet summer or knotted marjoram, *Origanum Marjorana*, which is given its due meed of praise in "As You Like It," "we may pick a thousand salads ere we light on such another herb;" pot marjoram, *Origanum onites*; winter marjoram, *Origanum hortensis*, and common or wild marjoram, *Origanum vulgare*. All except *Origanum Marjorana*, which in this country is treated as an annual, are hardy perennials and may be raised from seed sown in March or April in light sandy

soil. The perennials may be propagated by division in spring or autumn. All the sorts are aromatics of sweet flavor, supplying zest to soups, broths and stuffings.

Thyme is a sweet-scented aromatic evergreen small shrub. There are three varieties of the common *Thymus vulgaris*; the narrow leaved, the broad, and the variegated, propagated by division or cuttings. It makes a good edging for borders and is second only in vigor of scent to sage.

Rosmarinus officinalis, the rosemary, a hardy evergreen shrub, is a native of South Europe. The three varieties cultivated are the green or common rosemary (the hardiest and most generally cultivated), the silver-striped and the gold-striped rosemary. All the varieties prefer a light dry soil and a sheltered position. Propagation is by seeds or cuttings taken from the young shoots in July. Kept shaded and watered the cuttings root quickly. Rosemary is an excellent meat herb and is said to aid digestion. In Germany it is considered indispensable as dressing for chicken and in the salad bowl. Boiling water poured over an ounce of leaves makes a good hair rinse.

Tarragon, *Artemisia Dracunculus*, is an aromatic perennial herb which does not seed and is short-lived, so is propagated from off-sets or cuttings. The soil must be dry or the roots will perish in winter. The young leaves and shoots are put in pickles. Combined with minced shallot it is eaten with beefsteak or with vinegar for fish sauce.

Allium schoenoprasum, the common chive, is a small kind of onion, growing in tufty bunches with small bulbous roots. It will grow in almost any soil and situation and is produced by division in spring or autumn. Cut fine, it tops salads and seasons cream cheese and soups.

The robust herbs are borage, mint, sage, summer savory, winter savory, parsley, bay, fennel, caraway, dill, and horse radish. Borage is beautiful to look at, having flowers of lively blue. It is very valuable as a bee food plant. On the continent it was grown for culinary purposes. There is an old saying that it will thrive only near the dwellings of

men and will infuse courage into the one who partakes thereof. It is an annual, which if allowed, will seed itself freely.

The mints are hardy perennial plants. There are about forty species of the tropic and temperate zones. The commonly cultivated are the spearmint, *Mentha spicata*, and peppermint, *M. piperita*. The propagation and use are the same as other perennial herbs, culinary and medicinal. For lamb it has a particular value. "Mint were ever a good posy for students to smell of, for it quickens the brain."

Sage is a small, evergreen shrub which will grow in any garden soil, but a new planting should be made every two or three years, as the old plants are apt to become woody and naked. In gathering sage only the young side and top shoots should be cut. Tradition links it with fowl dressing. Sage tea is an old-fashioned recommended beverage.

Of the savories there are two species in cultivation; the winter savory, *Satureja montana*, and the summer savory, *Satureja hortensis*. The winter savory is a perennial and makes a good edging plant, but the summer savory is best treated as an annual which likes a light mellow soil. It lifts the somewhat flat string bean from the ordinary and gives a dash of spice to soup and meat loaf.

Caraway, *Carum carvi*, a hardy biennial and useful aromatic herb, prefers a light rich soil. Seed is sown broadcast or in drills in March or April. When the plants are two or three inches high, they must be thinned to about six inches apart. For a seed bed four feet by five, a quarter ounce of seed is sufficient. The seeds are used both in confectionary and medicine; also for distillation with spirituous liquors. The root is sometimes eaten as a vegetable.

1 1 1

If you are looking for a particularly good pine for any ornamental use, we suggest that you try *Pinus radiata*, the Monterey pine. The large specimens near the Forestry Building on the campus are truly beautiful trees. For something a bit more unusual, plant the long-needed Coulter's pine (*P. Coulteri*).

The Arboretum Bulletin

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SPECIAL NOTICE

To keep memberships in the Arboretum Foundation in good standing, dues should be paid during the month payable. A system has been established at the Foundation office, whereby memberships payable over three months will be dropped from the active membership rolls and the BULLETIN will be discontinued.

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1 1 1

Mr. Orrin Hale's report on his experiments
with a wide variety of vegetables in the Ar-
boretum demonstration garden during 1943
will be mailed to anyone requesting it.

Arboretum Activities

THE PAST year has seen a gradual, but
definite, improvement in the appearance
of the Arboretum. It would delight all of your
hearts to see one particular area in which a
grand job of landscaping and replanting has
just been finished on the day that this is
being written. Mr. Otto Holmdahl, one of
Seattle's best known landscape architects, has
completed a major operation on the beauti-
ful Tenny collection of rhododendrons in the
Glen, a group of plants which was much in
need of respacing and rearranging. The re-
sults of the operation are most heartening.
The beautiful, luxuriant shrubs seem already
to have sprung to new life. Giant, big-leaved,
bud-laden plants of many rare species now
fairly shout their beauty across the quiet
slope. Here, before us, a single, magnificently
formed *R. caucasicum* nestles against the
graceful, soft-green boughs of a lovely native
cedar; above us, out of an attractive rock
grouping, arise the beautiful foliage and
stems of a low-growing Asiatic form; stems
that support fat, swelling buds; below us, tall
plants of the yellow-flowered *R. lutescens*
blend perfectly with *R. augustinii*—a com-
bination which should give happy contrast.

In all truth, the sight is near breath-taking
to anyone who can appreciate what beauty
the next few months will bring in this small,
but most unusual, collection of prized rho-
dodendrons.

Azalea Way has come in for its share of
attention, too. Mr. A. Angus, another capable
gardener, has given much assistance in plant-
ing prominent groups of *Azalea mollis* and *A.*
occidentalis, provided through the kindness
of the Seattle Garden Club. All of the flower-
ing cherry and dogwood trees have been
worked over so that they can get air and
light.

The new lath house, fifty feet wide by two
hundred feet long, was completed in the
fall and more than half of the eight large
beds have been planted. As a matter of fact
much of the material which was planted in
the first beds last spring has grown so rapidly
that it must be moved out into the nursery
before the growing season begins.

After the very lean two-year period of 1941-1943, it was only natural that much general cleaning up was necessary. We began, in May of last year, with the areas adjacent to Lake Washington Boulevard and have continued into the more prominent tracts along the upper road. It is in these portions of the Arboretum that the most improvement can be noted and the work will be continued as rapidly as possible to the ultimate end that you will be as proud of the whole as you would justifiably be now of that part which encompasses the Tenny collection of rhododendrons.

Among Our Contributors

ONLY infrequently do we have an opportunity to present an article like the one entitled "Some Trees and Shrubs of Chile." The author, Mr. F. R. S. Balfour, of Stobo, Scotland, is without a doubt one of the most prominent men in horticulture in England. To be sure, those Northwest gardeners who have followed closely the work of the Rhododendron Society of England have come to know him through his outstanding contributions to that Society. But you should all understand, as will be apparent from a reading of the article, that rhododendrons do not constitute Mr. Balfour's sole interest. He is one of England's most widely traveled horticulturists and in his travels he has accumulated a wealth of information on many other types of plants by actual contact with them in their native habitats. Of particular interest to Arboretum members is the fact that Mr. Balfour was largely responsible for influencing Dr. Cecil Tenny to undertake the culture of rhododendrons here in Seattle. The beautiful Tenny collection now gracing our Rhododendron Glen is a direct outgrowth of this contact. You will find a reading of his article to be both refreshing and pleasant.

The name of Mr. John C. Wister, also appearing in this issue of the BULLETIN, will call to the minds of most of our readers many happy moments spent perusing a variety of books and magazine articles that he has au-

thored. Few, if any, names in American horticulture are better known. Mr. Wister is Director of the Scott Horticultural Foundation at Swarthmore College. In his article on lilacs he has presented a sound, sensible plan for a public display and collection of these beautiful plants.

Mrs. F. S. Flickinger is well known in the Northwest for her intense application to gardening. When she undertakes the study of any particular group of plants she does a thorough job of it. You will find her article on "Useful Herbs" a most timely one.

The commercial production of primroses and hellebores has been carried on at the Nevill Primrose Gardens at Poulsbo, Washington, for a number of years. As a result of her experience there Mrs. Ingeborg Nevill has learned many of the tricks which spell success in the culture of plants. She gives you the benefit of her store of knowledge in this issue with the first of two articles on the genus *Helleborus*.

New industries in the Northwest, that is what all of us want. And when a new industry is based upon a particular plant then we gardeners are all the more interested. Perhaps the bulb-growing industry should not be called "new." We have had it with us for some time. But the war has given a new opportunity for expansion and with a continuance of the intelligent assistance that is being given by both the federal and state governments there is no reason to doubt the permanence of the enterprise. Mr. Howard E. Andrews, the well-known horticulturist from the State Inspection Service, gives you some pertinent facts on the commercial production of bulbs. Whereas the article is presented from the industrial standpoint you will all appreciate that many of the "tips" on culture can be profitably applied in your own garden beds. In order to translate the correct strengths of the various recommended spray materials into quantities to fit your two or three-gallon sprayer we suggest you get in

touch with Mr. Andrews at the County-City Building, Seattle, or contact your county agricultural agent.

We have been trying for some time to find an authority who could tell us about moles and mole eradication. There have been any number of methods recommended—pin wheels, gas, flooding with water, poisoned earthworms, and so on. But now we have, from a man who has studied them, a clear-cut statement of a procedure that requires only the correct amount of perseverance. Mr. Theo. H. Scheffer of Puyallup, who has been associated with the U. S. Bureau of Biological Survey, gives you his views on the subject in a style that you will thoroughly enjoy.

Continuing our eastern Washington series is the article on spring flowers by Mr. Ray L. Gardner of Yakima. Mr. Gardner has succeeded in painting a lovely picture of the slopes of the Cascades and the adjacent desert region as they appear during the advancing season. Perhaps you, too, will feel that you want to visit those mountain slopes as soon as possible after reading of their beauty.

Sequence of bloom in the garden—color all through the season—that is what most gardeners want badly. To be able to choose the proper species and varieties so that the color-filled season can be extended with rhododendrons alone opens many new possibilities. Else Frye tells you in her concise way just what can be done about it.

Mr. A. P. Fredrickson, who is trying out a great many new things, particularly rhododendrons, in his well-arranged garden, tells

you about one of them which appears to have fine possibilities, *Rhododendron sanguineum*.

When one thinks of primroses in Northwest gardens one also calls to mind immediately the lovely garden of Ida Schibig. It is a real pleasure to us to be able to offer Mrs. Schibig's article on primroses and their culture. You can rest assured that her pronouncements stem from actual experience—experience which has brought with it a truly amazing amount of first-hand knowledge for one so young.

A fine Canadian friend of the United States, a keen observer of all things horticultural, a man who has followed gardening both as a hobby and as a profession, that is Mr. R. C. Palmer, Superintendent of the Experimental Station, Summerland, British Columbia, who expresses a timely opinion on "Gardening Provides Antidote for War Hysteria."

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Helleborus

INGEBORG NEVILL

THE genus *Helleborus* is a very interesting one and until recent years one that was sorely neglected. *H. niger altifolius*, or Christmas rose, is the one that is best known and loved and is by far the most important. It probably originated in Palestine, where there is a pretty legend about its bursting into bloom on the night that Christ was born. It has beautiful, pure white, anemone-shaped, five-petalled flowers, one to two inches across, with lovely yellow anthers. The blooms appear on fleshy stems about ten inches high, one or two flowers to the stem. The leaves are dark green and leathery, shaped very much like the foliage of some of the species peonies.

The plant is easy to handle. It likes a good, rich soil that is well drained. One need not be too particular about the location for it can be planted under deciduous trees or shrubs, or it will look well against a background of broad-leaved evergreens.

Plants grown from seed are much to be preferred to divisions and they should be left absolutely undisturbed. They will grow and bloom in the same place indefinitely, the only care they need is a good dressing of well-rotted manure placed *around* them in early fall. Under no condition let it fall on the crown, for the buds are formed in the fall and are liable to rot. If the leaves show black spots at any time, cut them off and burn them. It is also a good practice to cut off the old foliage after the flowers are gone or the old leaves become weather worn and unattractive. In this climate the plants are seldom in bloom before the middle of January.

The seed germinates very slowly and must be *absolutely fresh*. It can be sown in June

and will not show any sign of germination until the following spring. The little plants have long roots and are sturdy and can be transplanted when they have two *true* leaves. They usually bloom in three to four years from the time of sowing.

The mature plants will stand dividing, but they suffer a good deal and are apt to sulk for quite a while. The flowers will gradually turn pink and then coppery rose. At this period the seeds have begun to form within the five capsules at the center of the flower. The petals gradually turn green, at which time the seeds are black. The flower heads then bend down and the capsules pop open to scatter the seed on the soil below. It is quite beneficial to remove the flowers before they turn green and thus allow the strength to go back into the plant.

H. niger praecox is a smaller sister of the variety *altifolius*. It usually starts to bloom early in the fall and will carry on until January. It will thrive under the same treatment.

Helleborus orientalis, *H. corsicus*, *foetidus* and *cyclophyllus* will be treated later in another article.

• • •

Gardening Provides Antidote for War Hysteria

R. C. PALMER

Superintendent, Dominion Experimental Station, Summerland, B. C., Canada

THE STRENGTH of the British people lies in the fact that they are a nation of gardeners. Neither bombs nor bombast can shake the faith of the gardener. When affairs go wrong in Hong Kong, Manila, or Singapore, he has but to spend an hour pruning his dormant shrubs to reassure himself that periods of adversity are the forerunner

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of great activity to be followed in due course by the fruits of victory.

There is no better antidote for "war jitters" than a session with the garden spade. When nerves have been frayed by too close attention to radio news broadcasts, it is heartening to discover that there are just as many angeworms as ever in the garden soil—that buds are swelling, and seeds sprouting, just as they did in peace time—that Mother Nature loses no time in covering the earth with beauty again no matter how much devastation man may cause.

In the man who tills the soil the creative instinct is strong. His thoughts run along constructive lines. No one who has tended a Japanese maple or a gold banded lily will be guilty of such futile hysteria as resulted in the destruction of several magnificent double-flowering cherry trees just because they originated in Japan. On the contrary, he will cherish these beautiful garden subjects as evidence that somewhere in Japan there is a seed bed from which a new and better nation will emerge after this world conflict is over.

There is an obvious reason why millions of people in England are planning to grow vegetables this year . . . they will provide a much-needed addition to the food supply. However, it is encouraging to note that even in bomb-torn Britain the important function of ornamentals in promoting national welfare is still fully recognized. Already two prominent British firms have distributed 1944 catalogues listing a line of flower seeds. To a people who keep their courage high, their judgment clear, and their faith strong by growing beautiful gardens, overwhelming victory and a just peace are assured.

✓ ✓ ✓

Rhododendron Sanguineum

By A. P. FREDRICKSON

II SECURED from Mr. Carl English, Jr., in July, 1940, a small seedling that had been germinated from a package of seeds marked *R. sanguineum*, secured from the Royal Botanical Gardens, Edinburgh.

When we took it from the flat it was about

two inches high above roots and was about two years old. After placing it in my cold frame and lath house and then setting it out in the garden with other of the series *nerii-florum*, to which I am rather partial, I paid little attention to it excepting to notice that it was growing into a well-shaped and thrifty plant, doing quite well in an exposed position. In its fourth year it set flower buds—many of them—and I should have pinched them off to avoid too much vigor being sapped from the plant, but, of course, like other amateurs, I didn't. Fortunately, the next year it was vigorous and equally floriferous. It flowered for the first time in the last week of March, 1942. The very fleshy corollas of brilliant hunting-coat red were so numerous that the areas of flowers and leaves were about equal.

Since neither Mr. English nor I had ever seen *R. sanguineum* in flower, he came immediately to observe it, when I called him. He was so enthusiastic about it that he hurried home to examine his own plants and was quite joyful to find one of them in a shaded position, in bud. It flowered about two weeks later.

At that time I noticed that this plant did not have all the characteristics of *R. sanguineum*, its leaves being rather too pointed and too light a green, with seven to eight flowers in a truss. This did not conform to the description in the *Rhododendron Species* book which states that the leaves of *R. sanguineum* have an apex which is "rounded or obtuse" with three or four blooms per truss. Also it is supposed to flower in May. In these characters it is more similar to its sister *R. floccigerum*, though the indumentum is not floccose, as in the latter.

Whether it is *R. sanguineum*, or *R. floccigerum*, or a natural hybrid thereof, the plant certainly has interesting possibilities to the nurserymen and gardeners of the Northwest. It matures early, is an easy doer, is very floriferous and colorful, and is small enough even at maturity to warrant its use in the average city garden.

✓ ✓ ✓

The hellebores are among the few kinds of plants which are immune to attack by slugs.

Our Concern With Moles

THEO. H. SCHEFFER*

MOLES are not entirely a nuisance, except as they project themselves into our plans for sightly landscaping and the pleasant and profitable culture of certain floral types and garden crops. It seems scarcely worthwhile to bother with moles in pastures or in wild woodlands. In these situations, as elsewhere, they have always played their part in the economy of plant growth as affected by drainage and subsoiling factors, and will continue this activity where co-operating freely with other natural forces. In pastures, and even in haylands at the proper season, the heaps of subsoil thrust to the surface by the mole's activities may be redistributed by means of some sort of drag, to the advantage of the grass crop, as well as the satisfaction of the eye.

An arboretum, a park, a garden, a flower plot has man's beneficent attention and doesn't need the mole's services or the good offices, if any, of the gopher, the meadow mouse and some other wildings. It should be said right here that the meadow mouse is a satellite of the mole, following habitually in the latter's convenient runways for a part of its living, without rivalry, commonly, to the mole's interests in respect to choice of food. Some of the other lesser rodent ilk have this same habit though not so generally as the meadow mouse. To test this commensal habit in your locality, set a few ordinary snap mousetraps, properly baited, at various points in mole runways, covering the opening in each case through which the trap was introduced.

We have indicated that the food habits of these small mammals differ; they do markedly. The rodents search out the seeds, the bulbs, the roots and other plant structures, while the mole is a hunter trailing small living creatures to serve his appetite. These are easy to capture, for they shift about but slowly in the soil, or perhaps on the surface in mild, dewy nights, where the mole does not hesitate to follow, despite the additional risk to life, liberty and the pursuit of earthworms. We said

earthworms, because these constitute more than 90 per cent of the mole's food in a humid climate like that of the Puget Sound country. To this diet may be added such items as insects and insect larvae that inhabit the soil or the trash covering immediately above the soil. To this diet may also be added man's contribution in the form of sweet, germinating seeds, such as corn and peas, and bubblets the like of which the mole's dentition may encompass; for the creature is not built for gnawing. This detail of food habits does not constitute an alibi for the mole, however, in the destruction of choice plants through tearing the roots or drying the plants to death by upheaval from their bedding.

That the race may continue, the mole provides for herself a nursery of grass or trash in her underground burrow, in early spring, usually the latter half of March in the Pacific Northwest. Here she lays her young, commonly three only, but evidently enough to keep up a species which is not sought by predators as an item of food and is consistently rejected by callow or nursling when fond parents of wing or claw bring home moles or shrews as tidbit offerings. Speaking of the shrew, we may remark that the tiny mammal the cat sometimes brings in is just that, not a young mole, which latter is fat, pink and hairless for a time, and when it ventures into the runways in May or early June may scarcely be distinguished from its parents in size.

Much more might be said about the life of a mole that would intrigue our interest, but for present purposes we may continue only with means of circumventing the animal where it is entirely out of place in our artificial but, to us, pleasing situations. When all has been said and done (and a lot has been said and a lot has been done), we may trap the mole in its runways with a reasonable degree of success and with failure more often chargeable to the trapper than to mole shrewdness. Of course, we may occasionally swat the mole with shovel or axe, if we find the creature at work heaving up the ground, or we may strike in behind the course of its progress and then quickly dig the animal out. We may also, in some situations, have a chance to drown

*Collaborator, U. S. Biological Survey

a mole out with a hose or with ditch water; but bear in mind that a mole's ridged hunting paths connect up somewhere with his deeper runways, all of which are long and complicated and will require a lot of filling, in porous soil, whether with water or poisonous gas, as is also sometimes attempted. Moreover, it has been proven by trial that a mole, when hard pressed in this way, will often dig for safety, packing the dirt behind him and thus dam off the flow of danger.

Another recourse against the mole is to introduce objectionable or deleterious substances into the runways, as lye, creosote, carbide, naphthaline flakes. These and other substances, if not injurious to the plants, may serve for temporary protection from the pest on limited areas. Any poison that might be used to destroy moles is too dangerous to be handled by anyone but a trained expert and, that, too uncertain in its efficiency against a little animal that catches its food alive and eats it alive. The mole is not in any sense a scavenger. With certain precautions, poisoned baits for the rodent trespassers may be introduced into the mole runs, but a better plan is to keep the surface ridges trodden down and thus nullify the advantage of easy access to our plants, underground.

Then, to the trapping: There are three types of mole traps in common use in this country, all designed, without baiting, to ensnare the animal in its progress through the

(Continued on Page Twenty-Eight)

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MOLES

(Continued from Page Twenty-Seven)

runways, which may be either the upridged hunting paths of temporary use or the deeper and more permanent tunnels. One type of trap has loops or other devices to encircle the tunnel paths, another has jaws to straddle the runway, and a third has impaling spikes, driven downward by springs to pierce the mole when the trap is sprung. In fact they all depend upon action by springs, which are considerably stronger in this case than those employed in openly set traps for much larger animals in paths above ground, for the catching devices of mole traps must operate *through* the soil of your artificial obstruction in the underground pathway, as no part of a mole trap should be encountered by the animal in its natural attempt to dig through the obstruction and reopen its runs.

Trap sets may be made on the ridge roads if they are freshly constructed and stand up well, but better results are usually secured by placing the trap on the deeper passages, using a plant trowel to loosen the dirt and expose the tunnel. Make the opening from the surface only wide enough to accommodate the trap; line up the trap with the course of the runway; fill in loose dirt to block this runway, packing it snugly under the trigger only; cover the upper parts of the trap with a crate or trash if you wish to seclude it from observation or disturbance by passing animals.

There is so much intercommunication between the underground mole highways on given premises that it is often possible to drain the place of moles at one trapping point. Other situations will require more scattered settings—wherever fresh work is noticed. It is not the best practice to reset a trap at the spot where you have just taken a mole, until you may discover later that another mole has repaired the break you made and left open in the burrow. It is difficult to get a good trapset or good results in dry soil.

To avoid disfiguring a lawn or garden, or disturbing plants needlessly, one should dig for the trapset at some place along the borders, for the headquarters of moles are usually outside the cultivated plot; in wasteland, or

perhaps under fence rows, buildings, walks, and in other situations offering shelter. A furrow drawn along the borders of a tract you wish to protect from invasion by burrowing rodents and moles will simplify the problem of knowing where to trap the pest at its crossings, coming in.

A bit of explicit direction for setting a trap at a fresh mole hill will save some headaches. Remembering that such a hill is built, volcano fashion, by material thrust up from beneath, push aside the excavated earth and prod with a long pencil or slender, sharp stick for the lightly plugged crater. This will lead slantingly down to the underground tunnel on which the setting is to be made, whether shallow or several inches deep. Numbers of mole hills clustered about or strung along for considerable distances are no indications of many moles at work there; there may be only one, but it is not safe to bet on it.

Although vigilance and prompt measures against the "commando" invasions of the mole pest should be emphasized, a considerable measure of protection to smaller gardens, lawns, choice flower beds may be provided by underground barriers of suitable material, as wire netting or a thin cement wall. Directions for constructing the latter may be obtained by writing the U. S. Department of Agriculture, Washington, D. C., for Circular No. 381, "Rodents and Moles as Pests in Bulb Plantings." The netting barrier should have a mesh no larger than three-fourths inch.

1 1 1

Practice intense conservation in every detail of gardening during this war period. No organic matter should be discarded; the soil needs it. Practice correct fertilizer placement; avoid broadcast spreading; apply it in concentrated areas along the garden rows or around the individual hills or clumps. Avoid using the scarcer, more valuable sprays and dusts on plants which do not require them; for example, in combating flea beetles on potatoes use calcium arsenate instead of a pyrethrum-rotenone mixture. Save the latter for use on leafy vegetables or on any crop which produces the edible parts above ground.

Blooming Sequence of Some *Rhododendron* Species in 1943

ELSE M. FRYE

(Note: The asterisks (*) preceding the rhododendron names indicate the ratings given the individual species by the Rhododendron Society of England. Since new species have been brought in from time to time over a period of years and the ratings have not been revised so far as I know, it does not mean too much in a comparative way. At any rate it may not always coincide with our individual opinions. But it is interesting and at least gives us a starting point by which to judge.)

Early February

*****Rhododendron mucronulatum*. This rhododendron frequently starts blooming in December but in 1942-43 the unusual cold blighted the early buds and it was not until February that there was any great show of color. This is a deciduous rhododendron and the bloom is precocious. For that reason the plant should be given a background of green to set off the fragile pink to rose-magenta flowers. Much work has been done in selection of desirable color forms and pure tints. *Dauricum* series.

Middle March

****Rhododendron lutescens*. This rhododendron has very attractive foliage. The leaves are somewhat leathery, narrow and pointed like a willow leaf and contain a fair show of maroon-red color. The flowers are large, a pale greenish-yellow, with protruding stamens. A lovely thing. *Triflorum* series.

***Rhododendron Keiskei* has leathery leaves, the green slightly tinged with olive except when they are young and then the green is bright and tinged with gold. The flowers are a primrose yellow—a very good color with which to tie a mixed planting together. *Triflorum* series.

****Rhododendron ciliatum*. The leaves of this rhododendron are eye-lashed all around the margins. The flowers are in fair-sized clusters, rather waxy in texture and of an apple-blossom pink. It is usually included in any list of must-haves. *Maddenii* series.

Late March

*****Rhododendron racemosum*. This rhododendron is such a good and easy doer that there is little thrill in growing it. Neverthe-

less, no other plant can quite take its place. The leaves are oval, thick and leathery, gray but washed with rose-crimson. In the spring the young shoots also are crimson. It is very floriferous and a planting of this species is like an explosion of pink and rosy pink with some snow-white forms. *Virgatum* series.

****Rhododendron leucaspis*. This is a rhododendron to which one looks forward each year. The leaves are ciliate and more or less hairy ovals. The flowers are large, milk-white saucers which are enhanced by large brown anthers. It needs a sheltered place—too much weather injures the flowers. *Boothii* series.

***Rhododendron pemakoense*. This little bush very much resembles a colonial bouquet when in bloom. The green of the leaves shows only on the edge—like a frill. The flowers are a soft pink-mauve. The plant grows to about 12 inches in height but continually increases in diameter by means of suckers. *Glaucum* series.

Early April

****Rhododendron intricatum*. This species has small, bluish green, oval, aromatic leaves. The flowers are a lovely, soft, clear lavender, an old lady's color, and all the petals are a little crumpled in arrangement. This rather adds to their charm. In spring the bushlet is completely snowed under with bloom; in fall again there is a smattering. *Lapponicum* series.

*****Rhododendron hippophaeoides*. The color of the flowers of this rhododendron very much resembles that of *R. intricatum*, but they are much larger and primly just-so in the spread of their petals. *Lapponicum* series.

*****Rhododendron russatum*. The flowers are a rich dark blue. It would be close to slander to say there was a little purple in it but there is something that makes it almost iridescent. It is considered one of the most desirable of its clan. *Lapponicum* series.

*****Rhododendron Augustinii*. This is one of the rhododendrons that most nearly approaches a true blue in the color of its flowers. It grows to a large bush and is most generous in its bloom. There is said to be a good deal of variation in it so it is well to choose one in bloom or to know the stock from which it comes. *Triflorum* series.

Middle April

*****Rhododendron neriiflorum*. The flowers of this rhododendron are described as being "bright scarlet." These seem very dull words to describe the exciting color that it really is. It is a splendid carrying color and is always seen across the garden. The flowers are not enormous but take the interesting shape of beautifully formed bells. The leaves are a pleasant mild green, proper foil for the vivid blooms. *Neriiflorum* series.

*****Rhododendron Forrestii*. Only two blossoms enable me to add this rhododendron to this list. I believe there is some variation in the height to which it will grow. Some plants creep on the ground and others send up little branches some 8 to 12 inches. Among the thick dark green of the foliage appear enormous crimson bells. It is a red of depth but clear and vivid. *Neriiflorum* series.

Rhododendron elaeagnoides. In the form in which I have this plant it is a wee shrublet of 6 to 9 inches. The flowers are a soft yellow, saucer-shaped and facing outward. It also occurs with dull purplish flowers and I believe this color form is associated with taller-growing plants. *Lepidotum* series.

**Rhododendron canadense* is a deciduous species. It is a native American and is rather pretty as a sub-shrub in woodland because the clear pink flowers come only a little before the pale blue-green leaves. The effect is very spring-like. *Azalea* series.

****Rhododendron tephropeplum* does not have a too-rigid habit which makes it a most suitable plant to grow under taller rhododendrons. It keeps the ground cool for them and is in turn shaded from the sun. The flowers are beautiful waxy bells of soft clear rose. *Boothii* series.

****Rhododendron deleiense*. This plant closely resembles *R. tephropeplum* but the color is darker. *Boothii* series.

****Rhododendron calostrotum*. This is a low, rock-garden shrub with blue-green leaves and large open saucer-shaped flowers of a deep frosted rose. *Saluenense* series.

***Rhododendron chamaenum* is dark green with smaller flowers than those of *R. calos-*

trotum. The flowers are of the same color but without the white bloom. *Saluenense* series.

Rhododendron lysolepis. This little rhododendron has not been awarded any stars but to my notion it is one of the most valuable of its series. The leaves are dark green but with a decided gloss. The flowers are rather on the small side but there are many of them and they are a splendid blue. *Lapponicum* series.

Late April

Rhododendron cremastrum. This rhododendron has the smallish, waxy, purple-rose bells of its series; in its foliage it is not quite so attractive as some of the others. *Campylogynum* series.

****Rhododendron caloxanthum* is attractive in both color and size of foliage. The flower buds are waxy and folded almost as if sculptured, a primrose yellow tipped with russet-rose. It is lovely, having in some degree the element of surprise. *Thomsonii* series.

****Rhododendron orbiculare*. From the standpoint of foliage this species is one of the most beautiful. The leaves are roundish, drawn up into a heart-shape at the base. The color is bright but not dark green. The flowers are rose-pink and broad at the base. Eventually the shrub becomes wider than tall. *Fortunei* series.

***Rhododendron glaucum*. The foliage is decidedly pungent. The flowers vary from apple-blossom pink to a pale old rose. This is a good rock garden species. *Glaucum* series.

Rhododendron setosum. This rhododendron is interesting to have in a collection of specimens from the *Lapponicum* series. In its own right it is dull with small purplish flowers. *Lapponicum* series.

***Rhododendron rupicola* has dark red-purple flowers of good size and is not often seen in gardens. *Lapponicum* series.

*****Rhododendron Williamsianum*. The leaves of this rhododendron are smaller heart-shaped ovals than those of *R. orbiculare*. They are a lovely bronze-gold color in spring. The flowers are large waxy bells of apple-blossom pink. We are told there are two forms—one reaching three feet and the other close to the ground and more or less creeping. The plant

needs to be old and the wood mature before it will bloom. *Thomsonii* series.

***Rhododendron chryseum* is a fortunate break in that its clear primrose-yellow flowers highlight a planting made up of the various members of its series. *Lapponicum* series.

****Rhododendron rubiginosum*. The foliage is dark green and leathery. The flowers are clear mauve. It is considered a good plant in woodland with yellow primroses naturalized underneath. *Heliopsis* series.

(Continued on Page Thirty-Six)

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Unfortunately, it is difficult to purchase clean stock. There is, however, a simple alternative by which nematode-free stock can be obtained—propagate your own stock from soft-wood cuttings in May and June. The directions on procedure are quite simple. Make up a cutting bench or box with clean, sharp sand. Level off the sand, soak it *thoroughly* with water and tamp it well with a heavy block or brick. Take only the terminal cuttings from the new, young growth. Make them up in 4-inch to 6-inch lengths, being careful that they are cut just below a node or joint. Put them into fresh, cool water immediately as they are made. Insert them in the usual way and tamp each row firm so that no air spaces remain around the stems. If the cutting bench is in a cool greenhouse it will be necessary only to cover them with newspapers to reduce light and temperature, and to keep the humidity up. If one uses a flat, or a box, it is wise to cover it first with a pane of glass, then with newspaper, and to move to the cool, shady, north side of the house. In hot weather the glass can be raised on one side. When the roots form it can be removed permanently. After the cuttings have been inserted they must be watered immediately and heavily. At the fifth day

(Continued on Page Thirty-Four)

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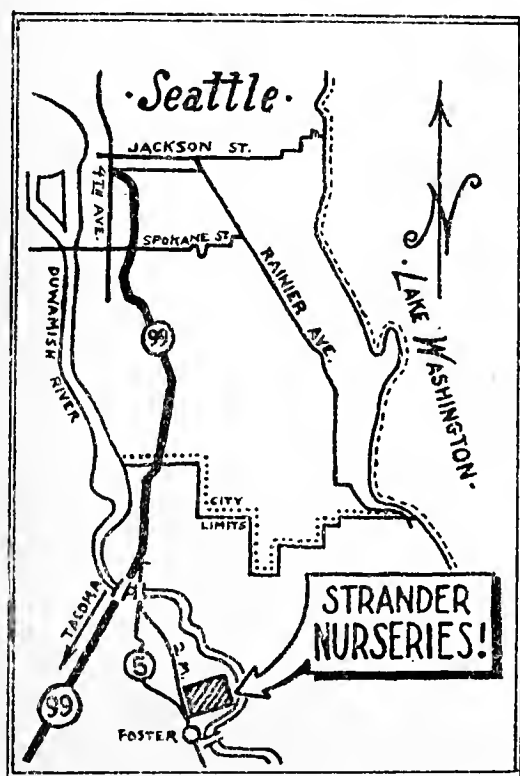
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PHLOX

(Continued from Page Thirty-Two)

they will need another heavy watering but thereafter it will be necessary only to keep the sand uniformly moist, not soaking wet.

If the sand medium is clean no nematode infestation can develop during this first stage, but great care must be exercised at potting time and again when the young plants are ready to set out, that they are not brought in contact with soil in which summer phlox has been grown previously. If there is any question about the cleanliness of the potting soil it should be sterilized. If possible, similar precaution should be taken with the soil in the garden beds, though it is usually sufficient to merely choose a new bed which has not contained phlox plants for three or four years. It should also be kept in mind that such a bed can easily be infected with nematodes if soil or trash are carried to it from other phlox areas in the garden.

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RHODODENDRONS

(Continued from Page Thirty-One)

*****Rhododendron scintillans*. A small shrub with dark lavender flowers of good size. *Lapponicum* series.

Early May

*****Rhododendron Souliei*. This is one of the loveliest rhododendrons with typical *Thomsonii* foliage. The buds are a deep crimson, opening to clear pink-rose and fading to white. *Thomsonii* series.

(It is unfortunate that the Rhododendron Society Year Book describes the flower as "little open saucer-shaped." "The Species of Rhododendrons," published by the Rhododendron Society, describes it as "openly cup or saucer-shaped." In the form which I have seen it is a cup or bell, broad at the mouth.)

****Rhododendron ledoides*. This species is a very nice one for rock gardens. The habit is inclined to be sprawling and the growth irregular. It is very floriferous with many small flowers in heads. These vary in color from rosy-pink to white and all are attractive. *Cephalanthes* series.

****Rhododendron Fortunei*. This is one of the handsomest shrubs among the taller species. The leaves are not its least attraction. They are large, long, ovals of palish glaucous green with a rose-purple petiole. The flowers are in great trusses terminating every branch and pale rose in color. This spring I saw another color form—it was that fascinating color made up of bright pink with the dimmest suffusion of pale yellow. Of the two I think this latter is more beautiful. *Fortunei* series.

Rhododendron camtschaticum is a beautiful small species, deciduous, putting forth leaves of that pale spring-like green early in the season and soon opens large saucer-shaped flowers of frosted rose. *Camtschaticum* series.

***Rhododendron oreotrephes*. The oval leaves are thick and glaucous green; the flowers a clear mauve. *Triflorum* series.

****Rhododendron exquisitum*. Very like *R. oreotrephes* but with larger flowers and possibly a more spreading habit. *Triflorum* series.

Rhododendron carolinianum. This North American has thick leathery leaves which take on a dark maroon-red in fall. The flowers are described as rose purple but the best forms are clear deep pink. *Carolinianum* series.

*****Rhododendron Vaseyi*. Another American, tall-growing and deciduous with smallish, pale pink to rosy-pink flowers. This is very lovely in woodland or planted against fresh green such as the young leaves of larch. *Azalea* series.

*****Rhododendron yunnanense*. This plant is inclined to sprawl so is enhanced by certain situations where it can do so with abandon. The flowers are white and fascinatingly freckled with cinnabar-red. *Triflorum* series.

***Rhododendron chartophyllum*. A smaller and paler edition in all its parts than *R. yunnanense*. *Triflorum* series.

Middle May

***Rhododendron pallescens*. This species is a compact, upright growing plant and very floriferous. The young shoots are pale rose-yellow which soon become green. The flowers resemble those of *R. yunnanense*, the freckling paler and more sparse. *Triflorum* series.

****Rhododendron Wardii*. Lovely, shallow, pendant bells of clear green-yellow. *Thomsonii* series.

***Rhododendron fragariflorum*. This rhododendron is almost evergreen but not quite. The flowers are a crushed raspberry-red and saucer-shaped. *Saluenense* series.

***Rhododendron campylogynum*. A small shrub of 6 to 10 inches, sending up new branches from the base not prolifically but occasionally and enough to make it more or less flat-topped. The leaves are thick, small ovals, dark green and shiny above, glaucous green beneath. The flowers are waxy little bells of purple rose, covered with a white, waxy bloom which occur singly or in twos. *Campylogynum* series.

****Rhododendron myrtilloides*. This is a more fastigate bush with longer and narrower leaves. The plant continually remains taller than wide. The flowers are similar to the above species. *Campylogynum* series.

***Rhododendron didymum*. A small shrub with very dark crimson flowers of silky texture. *Neriiflorum* series.

*****Rhododendron Griersonianum*. This rhododendron did not bloom in my garden in 1943 but did in 1942. However, it survived

an unusually devastating winter. It is mentioned now because it is so very lovely and because it will persist if not placed in the most rigorous exposure. The flowers are large bells of rich geranium red. *Auriculatum* series.

There are many possibilities in the use of these species rhododendrons in our gardens; some have been suggested in the foregoing remarks. But, for instance, the various members of the *Lapponicum* series could be gathered together to furnish an enchanting little moor on a rocky ledge or lower in some little meadow in the rock garden. They are also good as foreground plantings for some of the larger rhododendrons and other shrubs. I like to see *Rhododendron hippophaeoides* in front of *R. Augustinii*—the blues of the flowers are nice together. The spraddly growth of *Rhododendron glaucum* and *R. leucaspis* make very good accents in the rock garden if planted in small groups of not less than three. A plant like *Rhododendron Fortunei* is, of course, a planting in itself, but it can be enhanced by the proper background. In my garden I have used the blue of *Cedrus atlantica glauca*.

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Letters to the Editor

Dear Sir:

The very interesting article on "California Oaks" by Mrs. Thorgrimson in the September issue of THE ARBORETUM BULLETIN has prompted me to pass along to you a few personal observances of the live oaks in the Escondido Valley area, San Diego County, California.

From the building site on our wee citrus "ranch" about three miles south of the inland town of Escondido, we look right down on one of the very interesting live oak groves of southern California, part of which, including the oldest and largest oaks, has been preserved and set aside as Felicita Park. This is a large grove following an old creek bottom for about three-quarters of a mile, the southern end of the grove terminating in the beautiful Harold Bell Wright ranch estate, and is within the bounds of the old Spanish grant of Rancho San Bernardo. For several years Mrs. Ferguson and I have visited Felicita Park, always finding something new and interesting to us in the centuries-old trees and the bird life which abounds.

The three most common species of live oaks in the Escondido area are known locally as the white, the red, and the scrub, the first two by far the largest in number, size and age. The Felicita Park grove is made up almost exclusively of the white and red live oaks. The bark of the trunk and larger limbs of one of the very largest white oaks in the grove has for many years been bored by the California woodpecker and the long, sharp acorns of the adjacent red oaks driven into the borings by the hammer blows of the birds' beaks, practically covering all such bark surface. The acorns are stored, not for the food value of the acorns, but for the worms or grubs which eventually abide in the rotting acorns. There was a large white oak in the part of the grove on the Harold Bell Wright ranch also used as an acorn storehouse but the tree was recently cut down on account of old age. Only the white oaks are used as acorn storehouses.

On a recent visit to Felicita Park I was
(Continued on Page Forty)

Thirty-Eight

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LETTER

(Continued from Page Thirty-Eight)

disappointed at the evident abandonment of the large white oak as a storehouse. While wandering through the grove, pacing the spread of some of the trees, the greatest spread found being 115 feet, and inspecting the long twisted and turned limbs, many grown together to form loops and figure-eights and even piercing one another, I heard the "rat-tat-tat" of beaks and on investigation found six California woodpeckers hard at work on a large power pole on a little-used road adjoining the grove. This pole and its three smaller poles carrying guy wires were almost completely bored and filled with acorns of the red live oak. Also eight large nesting holes were counted.

An interesting side light is the fact that to this day the Felicita Park grove is known to the Poway Indians as the Judgment Grove and according to the Indian legend was used as a torture chamber where evil doers of their own tribe were punished in a manner which today would seem inhuman. Adultery, cowardice, and theft were the worst crimes. On conviction of adultery, the punishment tree selected for the prison was prepared by tree surgeons as skillfully as those who later preserved these monarchs of the forest, and young, pliable saplings cut from the growing tree were grafted into one of the large limbs high above the ground and the unhappy victims were securely bound to the tree branch and hung, bound closely together, suspended in the oaks. The victims were carefully tended and fed, and diligent care was given the grafted limbs so they grew and encircled their helpless prey. The legend tells of cruel tortures inflicted on these wrong doers by young and old. Cowardice was also a crime punishable by the living death, but the victims were confined in a death cell hollowed out of the lower trunk of the large trees, where they were exposed to the abuse of the children and braves. Thieves usually suffered a year's imprisonment in the hollowed out upper side of a large limb, open to the sun and weather.

In talking with Mr. James B. Dixon, an

authority on birds and a long resident of the valley, I learned that the California acorn woodpecker is one of the hardest working birds as well as a big clown at times. This brought to mind a meeting of some one hundred men in this same grove, which I attended a few years ago. The grove was full of woodpeckers, and, whether for the fun of it or because they resented our intrusion, they continually pelted us with acorns in much the same manner that the gulls drop clams on our Puget Sound shores.

The acorn of the white oak is stubby and rounded, while that of the red oak is long, slender and sharp. The white oak has oblong leaves with no marginal teeth, the red oak leaves being larger and greener and with marginal teeth. The red oak has reddish wood. From Mrs. Thorgrimson's article and a study of the U. S. publication "Forest Trees of the Pacific Coast," it is my personal amateur opinion that the Escondido locally known white and red oaks are varieties of the well known California live oak and the canyon live oak, respectively.

Sincerely yours,

(Signed)

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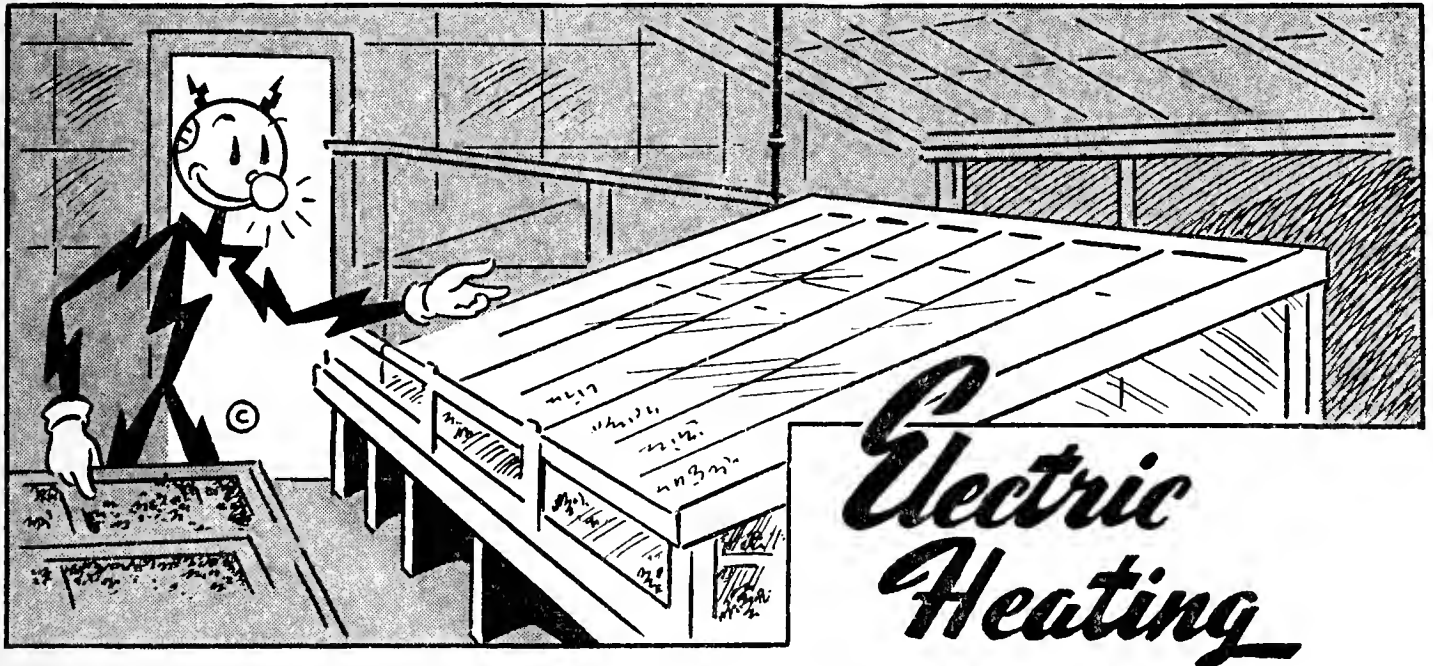
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